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THIS SERIAL PUBLICATION is intended primarily as a channel for the publication of articles by Oxford authors. Contributions from elsewhere will, however, be considered, and should be sent to the General Editor. While most of the articles will be concerned with Economics, the editors also hope to publish occasional articles on Economic History, Public Administration, and Scientific Method, provided these are likely to be of general interest to economists.

EVALUATION OF REAL NATIONAL INCOME

By PAUL A. SAMUELSON

Introduction

1. Improved measurement of national income has been one of the outstanding features of recent progress in economics. But the theoretical interpretation of such aggregate data has been sadly neglected, so that we hardly know how to define real income even in simple cases where statistical data are perfect and where problems of capital formation and government expenditure do not arise.

In 1940 J. R. Hicks made an important advance over the earlier work of Professor Pigou. This has given rise to recent discussions between Kuznets, Hicks, and Little, but the last word on the subject will not be uttered for a long time. I have tried to treat the problem somewhat exhaustively in this paper, relating it to the modern theories of welfare economics of Pareto-Lerner-Bergson type. The result is not easy reading even to the author—but without such a careful survey I doubt that even the classical writings of Pigou can be adequately gauged.¹

2. In Fig. 1, the point *A* represents observed consumption data for a single consumer in equilibrium at the indicated price-slope line through *A*. All the other points are each to be regarded as alternative to *A* and have nothing to do with each other. The following statements are immediate consequences of the modern theory of a single consumer's behaviour and are based on $\sum pq$ data such as the national income statistician might be able to measure:

- (a) We can immediately infer that *B* is on a lower indifference curve than *A*.

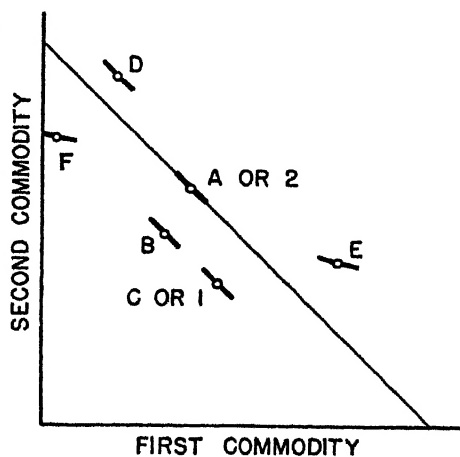


Fig. 1

¹ The principal references are to J. R. Hicks, 'The Valuation of the Social Income', *Economica*, 1940, pp. 105-24; Simon Kuznets, 'On the Valuation of Social Income—Reflections on Professor Hicks' Article', *Economica*, Feb. 1948, pp. 1-16, and May 1948, pp. 116-31; J. R. Hicks, 'The Valuation of the Social Income—A Comment on Professor Kuznets' Reflections', *Economica*, Aug. 1948, pp. 163-72; I. M. D. Little, 'The Valuation of the Social Income', *Economica*, Feb. 1949, pp. 11-26; A. C. Pigou, *Economics of Welfare*, 4th ed. (1932), Part I, especially chaps. ii, iii, v, vi; P. A. Samuelson, *Foundations of Economic Analysis* (1948), chap. viii. Since writing this article I have benefited from reading two

- (b) Less directly, but with equal certainty, C reveals itself to be inferior to A .
- (c) The point D reveals itself to be superior to A .
- (d) The points E and A reveal nothing about their order in the consumer's taste-pattern.
- (e) The point F is inconsistent with A . The consumer has changed his tastes, or he is not in equilibrium at the indicated points.

Problems of Inference from Group Market Data

3. Let us now regard Fig. 1 as applying to market data for two or more individuals, so that each quantity, q , represents the total of two or more individuals' consumption, $q' + q'' + \dots$, &c. The slope through A or any other point represents the market-price ratio of the first and second goods, the only commodities in our simplified world.

What can we now say about our points? Advances in the theory of welfare economics since 1940—many of them growing out of Hicks's own researches—suggest that certain of the definitions and propositions then laid down need to be modified. I resurrect these matters only because most people who have seen the recent discussion between Kuznets, Hicks, and Little must find their heads swimming, and must be in considerable doubt as to what the proper status of this vital matter is.

4. First we may clear up one misunderstanding, in itself unimportant, but giving an initial clue that we cannot make any very sweeping inferences from aggregate price-quantity data. In 1940 it was held that a situation like that of A and F is quite impossible on the assumption that individuals preserve the same well-defined tastes and are in true equilibrium in competitive markets.¹ It was held that, for national totals,

$$\sum p_2 q_2 > \sum p_2 q_1 \quad \text{implies} \quad \sum p_1 q_1 < \sum p_1 q_2.$$

As stated earlier, for a single individual this would be a correct assertion; but it is definitely false for group data involving two or more individuals. Examples to show this can be given *ad lib*. No recourse need be made to the Kuznets case of necessities and luxuries (understanding by the latter, goods which some individuals do not choose to buy at all)—but, of course, there is no reason why such examples should not also be used. Perhaps the very simplest example to illustrate the possibility of a contradiction would be one in which we keep the exact national totals of the point A , but reallocate goods between the individuals so that they come into final equilibrium with a new and different price ratio. Then already we are on

further papers by Little and from corresponding with him. See I. M. D. Little, 'The Foundations of Welfare Economics', *O.E.F.*, June 1949, and an addendum to his *Economica* article 'A Note on the Significance of Index Numbers'.

¹ See *Economica*, May 1940, pp. 112-13.

the borderline of a contradiction, and by making a slight change in the totals we can obviously get a strong outright contradiction.

Already we are warned that $\sum p_2 q_2 > \sum p_2 q_1$ cannot imply that the second situation represents an 'increase in social real income' over that of the first—since this implication would leave us with the real possibility that each situation is better than the other!

This should also warn us against thinking that we can save such a definition by applying it only where there is no such outright contradiction. For suppose that we consider a case which just escapes *revealing* itself to be contradictory; being so close to a nonsense situation, such a case can in no wise escape being subject to the same *fundamental* (as yet undiagnosed) difficulty, even though it may not be advertising the fact to us.

Inadmissibility of the 1940 Definition of Increased Real Income

5. This tells us already that either there is something inadequate about the 1940 definition of an 'increase in society's real income' or else there is something faulty about the logical proof that the index-number criterion $\sum p_2 q_2 > \sum p_2 q_1$ implies such a defined increase in real income.

The 1940 passage in question is so compact that one must be careful in interpreting it. In my judgement the root of the trouble lies more in the inadequacy of the definition enunciated than in the logic of the demonstration that the stated index-number criterion does imply an increase in defined real income. Although it has already been extensively requoted, the relevant 1940 passage is so brief that it can be given completely here.

'... What does it signify if $\sum p_2 q_2 > \sum p_2 q_1$?

'It should first of all be noticed that since this condition refers only to the total quantities acquired, it can tell us nothing about the distribution of wealth among the members of the group. There may be a drastic redistribution of wealth among the members and the aggregates will remain exactly the same. Thus what the condition $\sum p_2 q_2 > \sum p_2 q_1$ tells us is that there is *some* distribution of the q_1 's which would make every member of the group less well off than he actually is in the II situation. For if the corresponding inequality were to hold for every individual separately, it would hold for the group as a whole.

'As compared with this particular distribution, every other distribution of the q_1 's would make some people better off and some worse off. Consequently, if there is one distribution of the q_1 's in which every member of the group is worse off than he actually is in the II situation, there can be no distribution in which everyone is better off, or even as well off. Thus if we start from any actual distribution of wealth in the I situation, what the condition $\sum p_2 q_2 > \sum p_2 q_1$ tells us is that it is impossible to reach, by redistribution, a position in which everyone is as well off as he is in the II situation.

'This would seem to be quite acceptable as a definition of increase in real social income. Let us say that the real income of society is higher in Situation II than in Situation I, if it is impossible to make everyone as well off as he is in Situation II by any redistribution of the actual quantities acquired in Situation I. If this definition is accepted, our criteria can be applied to it without change.'¹

¹ J. R. Hicks, 'The Valuation of the Social Income', *Economica*, May 1940, p. 111.

6. A diagram that we shall place major reliance on in the later discussion can be used to illustrate exactly what is involved in this definition of an 'increase in social real income'. On the axes in Fig. 2 there is laid out the ordinal utility of each of two individuals: the exact scale of U'' or U' is of no consequence, only the north-south and east-west orderings being important. Corresponding to the point A or 2 in Fig. 1, there will actually be some allocation of the total of goods between our individuals, and hence some determined level of well-being for each. Let the point labelled 2 in Fig. 2 represent that actual level of ordinal well-being. Now consider the other situation that was labelled C or 1 in our earlier figure. Behind the

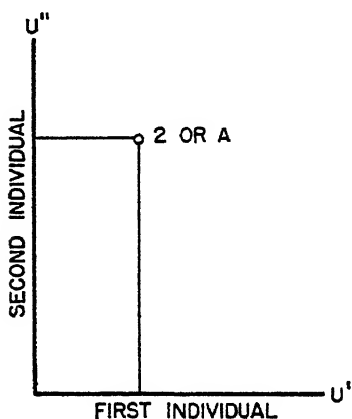


FIG. 2

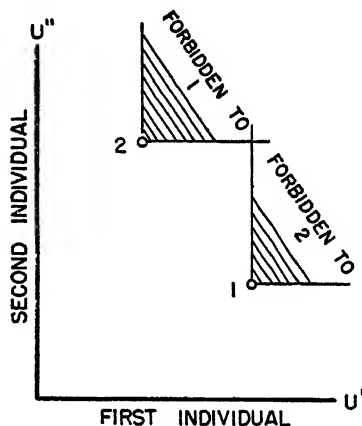


FIG. 3

scenes, unknown to us from the totals, there is again an actual allocation of the goods to the individuals and again a new point in Fig. 2. If we knew where it was, we could write it in and label it 1. We do not know where this new point will fall: it may be south-west of point 2 so that all individuals are worse off, or south-east so that one individual is better off and the other worse off, and so forth.

Hicks's 1940 definition of an increase in real income from the point 1 to 2 consists of this: if we can be sure that neither point 1 nor any reallocation of its quantities among individuals lies north-east of point 2 (with both individuals better off in 1 than in 2), then point 2 is defined to represent an increase in real income over point 1.

How acceptable is this definition, leaving aside for the moment the question of whether the index-number criteria does permit us to place such a restriction on the admissible position of point 1? Upon reflection, we will all agree, I think, that such a definition is not very satisfactory. By means of it a point 1 may be both better and worse than another point 2. This is shown in Fig. 3. Also the definition has small claims on

our affections in terms of our common-sense intuitions. Its last disadvantage is a subtle but important one: correctly stated, the new welfare economics is a body of doctrines which attempts to go as far as possible in preparing the way for the final a-scientific step involving ethical judgments; it should never, therefore, prejudice the final step, but only make statements which are uniformly valid for a wide class of ethical systems. Suppose now that we have given to us in Fig. 2 a set of social indifference curves (the contours of a Bergson social welfare function). It is more than possible that a 'point' or 'situation' (they are not quite the same thing) judged by the 1940 criterion to be the superior one may actually be the 'inferior' one in terms of the wider ethical judgements.

7. Instinctively Hicks was reaching out, I believe, for a rather different definition than the one he actually enunciated. The simpler problem of comparing *A* and *B* in Fig. 1 will bring this out and at the same time require no intricate index-number reasoning. As before, corresponding to the point *A* in Fig. 1 there is in Fig. 2 a point 2 representing the ordinal well-being of all individuals. Now with less of *all* goods available to society as shown by *B*, there will be a new point of individuals' well-being in Fig. 2. Where will the new point lie with respect to the former point 2?

We would have to give the unsatisfactory answer 'anywhere' were it not for one important assumption. We have assumed that behind the scenes of *A* all individuals are in competitive equilibrium facing the same price ratio. This assures us that all marginal rates of substitution are equal and that there exists no reallocation of the goods of *A* between them which will permit them both to be better off. (In technical parlance the competitive solution lies somewhere on the *Edgeworth contract locus*.) *A fortiori*, for a point like *B*, which involves smaller totals for *every* commodity, there is *no* reallocation of goods that could possibly make all individuals better off than they were in *A*. Without introducing price or index numbers, we know therefore that the point *B* is forbidden to be north-east of the point 2—and we know that *B* corresponds to a decrease in real income over *A* according to the old 1940 definition.

But that is not really saying much. It is possible that one individual may be worse off even though the other individual is better off. And we must still entertain the darkest suspicions of a possible contradiction. But this simple case turns out to have at least one surprising feature: if we try to reallocate goods in either of the two situations—always letting the individuals come ultimately into competitive equilibrium—it turns out that we shall *never* find a case where on the 1940 definition the situation *B* turns out to be 'better' (as well as 'worse') than *A*. I have not yet proved this in my discussion; but, accepting this fact as true, we find

ourselves on the trail of a better way of defining an increase in real income—or more accurately, an increase in *potential* real income.

The Crucially Important 'Utility-Possibility Function'

8. Let us consider all possible reallocations between individuals of the consumption totals corresponding to *A* or 2. For each way of allocating the goods there will be a given level of well-being for each and every individual—as can be indicated by a point on the U' - U'' diagram. The totality of all such possible points obviously cannot go indefinitely far in the north-east direction; equally obviously there is a frontier curve or envelope giving, for each amount of one person's utility, the maximum possible amount of the other person's utility. This frontier is the important 'utility-possibility function' corresponding to *A*.

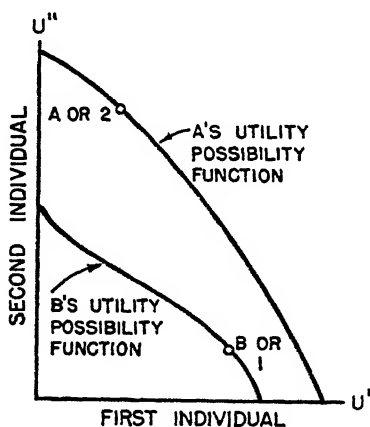


FIG. 4

The point 2 happens to lie on the frontier because at 2 all individuals are known to be in competitive equilibrium. Corresponding to the smaller totals of point *B*, there is also a utility-possibility function. We can now state the sense in which *A* or 2 is *potentially* better than *B*.

The total of all goods being greater in *A* than in *B*, the utility-possibility function of *A* is uniformly outside and beyond the utility-possibility function of *B*. (This is shown in Fig. 4.) The reason for this statement is intuitively obvious and can be expressed in the language of a currently popular song: *A* can do everything *B* can do—(and) better.

9. This, then, is the sense in which we can, without introducing detailed ethical assumptions, define an 'increase in society's potential real income in going from point *B* to point *A*'. Such an increase means a uniform outward shift in society's utility-possibility function.

Let us now return to the index-number problem. Can we infer that *A* is superior to *C* in terms of our new definition of potential real income?

If we can, then with minor modifications the 1940 analysis can be accepted. But, unfortunately for economic theory, we cannot make any such inference about potential superiority from the index-number analysis of aggregate price-quantity data.¹

Any single counter-example will prove the falsity of the index-number criteria as applied to more than one individual. Perhaps the simplest such example would be one in which the first individual cares only for so-called necessities. If less of total necessities are available in A , then A 's utility-possibility curve must cut inside of B 's when we get in the region of the $U''-U'$ quadrant favouring the necessary-loving individual; and hence A cannot represent an unequivocal increase in potential real income. Simple as this example is, it is open to the objection that it seems to involve the case where the individuals consume nothing of some commodity. Actually this is an irrelevant feature of the example.

But, in any case, greater insight into the nature of the problem can be had if we examine the steps in the reasoning linking up the index-number criterion and the 1940 definition of an increase in real income.

10. If we have between the points A and C , or 2 and 1,

$$\sum p_2(q'_2 + q''_2 + \dots) > \sum p_2(q'_1 + q''_1 + \dots),$$

then according to the 1940 argument we can find some redistribution of the quantities in C or 1, so that the new quantities of every good going to each individual, which we may call

$$q'_3 + q''_3 + \dots = q'_1 + q''_1 + \dots,$$

are such as to make the crucial index-number criteria hold for each and every individual; namely,

$$\sum p_2 q'_2 > \sum p_2 q'_3, \quad \sum p_2 q''_2 > \sum p_2 q''_3, \dots$$

Hence there exists a new situation resulting from the reallocation of the q_1 's which is worse for *every* individual than is situation 2.

A missing step in the 1940 logic must be filled in at this point. The fact that we can reallocate the q_1 's to get a new point q_3 which makes both individuals worse off than they are in 2 is taken to mean that the utility-possibility curve of 1 must be south-west of the point 2. But nothing has been said to show that q_3 is a frontier point on the utility-possibility function of point 1. Fortunately, it can be easily proved that there does exist at least one (and actually an infinite number) reallocation of the q_2 's that

¹ Simple logic tells us that this negative answer must be forthcoming in a comparison of A and F since each of two curves cannot both lie uniformly outside of each other; and already we have soon reason to believe that the A and F comparison does not differ materially from that of A and C .

(a) lies on the utility-possibility function of 1, and (b) causes our index-number criteria to hold for each and every individual.¹

With the above provision, we may accept the 1940 demonstration that when aggregate data satisfy the index-number criterion, the 1940 definition of superiority is definitely realized.² But there is nothing in this demonstration that tells us whether the utility-possibility function of 2 lies above (or below) the point 1;³ all we know is that 1's utility-possibility function lies somewhere south-west of the point 2.

¹ Fig. 5 shows all this. An Edgeworth-Bowley box has been drawn up with the dimensions of the quantities in the q_1 situation. From the south-west corner of the box we measure off the consumption of the first individual, U' . From the north-east corner we measure downward and to the left the consumption of the U'' individual. Any point in the box represents a possible allocation of the total q_1 quantities, with the point marked q_1 being the one actually observed.

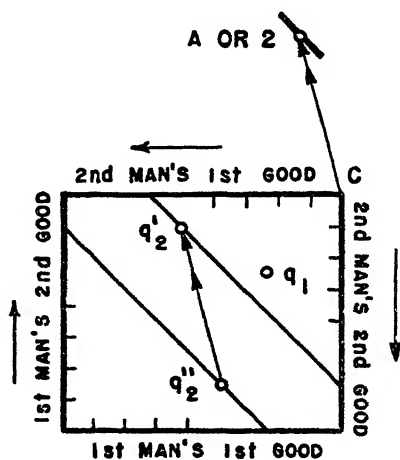


FIG. 5

On this same diagram we may also show the actual quantities consumed by the individuals in the q_2 situation. But now it takes two points in the box, as far apart from each other as C is from A . They are marked q'_2 and q''_2 respectively, and the price-lines through their points are drawn in with the slope of the p_2 situation.

As the picture stands q_1 does not satisfy the index-number criteria for the U' individual since q_1 does *not* lie inside the crucial triangle of the point q'_2 . Hicks's statement is that there is some reallocation which will move the point q_1 to a new point q_3 which lies between the two parallel lines. For any such point our index-number criteria are satisfied for both individuals. The missing step is to show that there exist points in this strip which are also on the Edgeworth contract curve. Since the contract curve must go from one corner of the box to the other and pass through all levels of U' and U'' , it must obviously somewhere pass through the intervening strip between the parallel lines. This supplies the missing step. Readers of Kuznets should note that it is the totals of q_1 , not of q_2 , that are reallocated so as to lead to Hicks's conclusion.

² This is apparently what Little means when he concludes that the 1940 definition is 'immune from Professor Kuznets conditions' (*loc. cit.*, p. 13).

³ In any case, no one should think that the condition

$$\sum p_2 q_2 > \sum p_1 q_1$$

which is satisfied in C (but not in F) helps to rule out a contradiction.

11. Our final conclusions may be summarized briefly. The index-number criterion

$$\sum p_2(q'_2 + q''_2 + \dots) > \sum p_2(q'_1 + q''_1 + \dots)$$

tells us that the utility-possibility function of 2 does lie outside of that of 1 in the neighbourhood of the actual observed point 2—but that is all it tells us. The curve may intersect and cross elsewhere—as shown in the later Fig. 6.

The Hicks-Kaldor-Scitovsky Version of New Welfare Economics

12. Having failed to relate the stronger definition of potential superiority to index-number criteria, we must reconsider whether, after all, the 1940 definition of superiority may not be tolerably acceptable. If we examine this definition, we find that it is in all essentials the same one as that earlier suggested by N. Kaldor and by Hicks in his earlier article on the 'Foundations of Welfare Economics'.¹ It will be recalled that these two writers had ruled that situation *X* is better than situation *Y* if there exists a reallocation of the goods in *X* which makes everybody better off than he was in *Y*. Except that the 1940 definition applied to a decrease in well-being between 2 and 1, this is identical with the earlier 1939 definition.

Dissatisfaction early developed over the 1939 definition. In particular T. Scitovsky² came forward with the objection that it seemed to assume that there was something right (ethically) about the distribution of income in the *status quo ante* of the *Y* situation. To get around this he suggested (in effect) that a double test be applied.

To say that '*X* is better than *Y*' we must be sure that (*a*) there exists a reallocation of the *X* goods that could make everybody better off than he actually was in *Y*; and (*b*) we must make sure there exists a reallocation of the goods in *Y* that could make everybody worse off than he actually was in *X*.

Or, in our terminology, the Scitovsky definition of superiority requires the utility-possibility curve of one situation to be beyond that of the other in the neighbourhood of both actual observed points.

13. In his criticism of the 1940 definition Kuznets can be generously interpreted to be trying (presumably independently) in effect to reiterate the Scitovsky double criterion. Kuznets says at one point that we must

¹ N. Kaldor, 'Welfare Propositions in Economics', *Economic Journal*, xlix, 1939, pp. 549–52; J. R. Hicks, 'Foundations of Welfare Economics', *Economic Journal*, xlix, 1939, pp. 696–712.

² T. Scitovsky, 'A Note on Welfare Propositions in Economics', *Review of Economic Studies*, 1941, pp. 77–88, and 'A Reconsideration of the Theory of Tariffs', *Review of Economic Studies*, 1942, pp. 89–110. To be precise Hicks is in 1940 riding the Scitovsky and Kuznets the Kaldor horse.

supplement the Hicks condition [that there must be a reallocation of the q_1 's that makes everyone worse off than he actually was in the q_2 situation] by the further condition that '[it must be] impossible to make *everyone* as well off as he is in situation I by any redistribution of the actual quantities acquired in situation II' (*Economica*, 1948, p. 4).

Kaldor has explicitly accepted the Scitovsky correction, and as far as I know so has Hicks. Therefore they would both presumably have no quarrel with this Kuznets reversibility condition.¹ But both Kuznets and Hicks do not seem to realize that the difficulty is basic and has nothing to do with the question of substitutability of necessities or luxuries. On the Scitovsky-amended definition, the whole demonstration of superiority of one position over another by aggregate index-number criteria breaks down completely.²

14. Our whole theory of arriving at a measure of real income by aggregative price-quantity data has broken down. But the worst is still to come. The Scitovsky conditions are themselves very definitely unsatisfactory. It is not enough to double the 1939 conditions—we must increase them infinitely. Instead of a two-point test we need an infinitely large number of tests—that is to say, we must be sure that one of the utility-possibility functions *everywhere* lies outside the other. Without this test at an infinite number of points, no acceptable definition of an increase in potential real income can be devised at the non-ethical level of the new welfare economics.

Just as Scitovsky has criticized Kaldor and 'compensationists' for assuming the correctness of the *status quo ante*, so we must criticize him for assuming in some sense the correctness of the *status quo ante* and/or the *status quo post*.

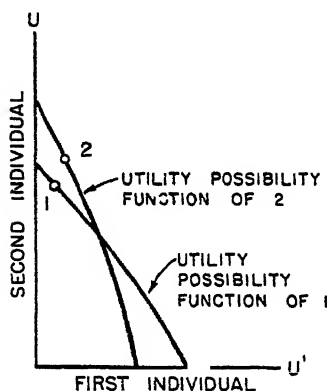


FIG. 6

Suppose, for example, we have *everybody* actually better off in situation 2 than in 1. Kaldor and Hicks will be satisfied to call 2 better than 1. So will Scitovsky. But the utility-possibility curves might very well cross as in Fig. 6, so that according to many ethical welfare functions both Scitovsky and the others would be rendering false statements.

What Scitovsky should have done was to free all of his comparisons from any depend-

¹ Little has argued (*Economica*, 1949, pp. 12-16) that there is a confusion in Kuznets on the point of reversibility. Perhaps I am setting down what Kuznets should have meant rather than what he meant to say.

² The best that we can say is the following. Imagine the change from point 2 to point 1 to be a continuous one. So long as the two points are sufficiently (!) close together, then the condition $\sum p_2 q_2 > \sum p_2 q_1$ assures us that 2 is better than 1 in the Scitovsky sense. For changes of any size $\sum p_2 q_2 > \sum p_2 q_1$ tells us that 1 *cannot* be superior to 2 in Scitovsky or in my sense, and that is all it tells.

ence upon either *actually observed* $U''-U'$ situation. He should, instead, have made the comparison depend upon the totality of all *possible* positions in each situation. This would have led to the definition of potential real income earlier proposed, which seems to be the only satisfactory, self-consistent definition within the sphere of the 'new' (relatively *wert-frei*) welfare economics. Aggregate index numbers can tell us little about this except in a negative way. Even this definition is not—by itself—worth very much of anything for policy purposes, as will be shown.

Inadequacies for Policy of the New Welfare Economics

15. We have seen that the new welfare economics is able to define an increase in potential real income which is unambiguous, consistent, and which will not turn out to contradict a wide class of ethical social welfare functions that must later be introduced into any problem. The new welfare economics does not go all the way in settling the problems of normative policy: taken by itself, and without supplementation, it goes virtually none of the way; but taken in conjunction with later ethical assumptions, it attempts to clear the way of all issues that can be disposed of in a non-controversial (relatively) ethical-free fashion. This is the solid kernel of usefulness in the new approach begun by Pareto, and this should not be lost sight of in the welter of exaggerated claims for the new welfare economics.

The inadequacy for actual policy decisions—even in the most idealized, simplified world—of all of the discussed measures of 'real income' can be illustrated by numerous examples. Consider the very best case where we can establish the fact that situation 2 is *potentially* better than 1 (in the sense of having a uniformly farther-out utility-possibility function). Would a good fairy given the chance to throw a switch from 1 to 2 be able to justify doing so? Upon reflection we must, I am afraid, answer *no*. Potentialities are not actualities—and unless she can give a justification of her act that will satisfy all reasonably defined social welfare functions, she cannot know whether or not to pull the switch.

A few negative remarks are possible: for any ethical system with the property that an increase in one individual's well-being is, others' being equal, a good thing¹—for all such systems a final optimum position must necessarily be on 2 and not on 1. That we can certainly say. But without going into the realm of (modern, streamlined) 'old' welfare economics, we cannot say more or get conclusive advice on this problem of policy. The attempt to divide the problem into two parts so that one can say 'a change from 1 to 2 is *economically* desirable in the sense of objectively increasing

¹ i.e. for all social welfare propositions W , with the property $W = F(u', u'', \dots)$ and $\frac{\partial W}{\partial u'} > 0 < \frac{\partial W}{\partial u''}, \dots$

production or wealth, whether or not the actual resulting situation will be ethically superior', only gets one into a semantic snarl and glosses over the intrinsic difficulties of the problem.

How much more severe are the policy limitations of some of the modern even weaker 'compensationist' definitions. Following them, the good fairy might do perpetual and irremediable harm. Suppose, for example, that our two *actually observed* points, 1 and 2, both lie above the intersection of the two schedules in Fig. 6, but with the point 1 being south-east of point 2, so as to represent an increase in well-being of one individual and a decrease for the other. The Kaldor condition would be satisfied and so would the Scitovsky condition. Suppose that once the angel has thrown the switch, she can never again reverse it (e.g. capital sunk into a mine may be irrecoverable). Let her now follow the counsel of the compensationists and throw the switch from 1 to 2. According to any ethical view that considers individual U' to be of the elect (or relatively so) and U'' to be relatively undeserving of consideration, the good life lies in a rather easterly direction. For ever and ever 'society' is condemned to 'unhappiness' because of the premature decision based on the Kaldor-Hicks-Scitovsky rules.¹

Production Possibilities and Group Inferences

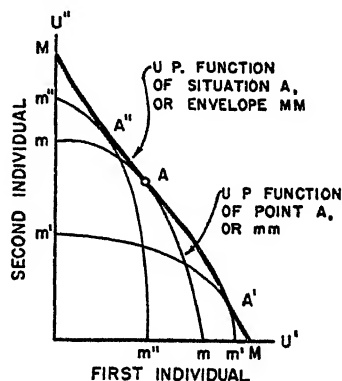
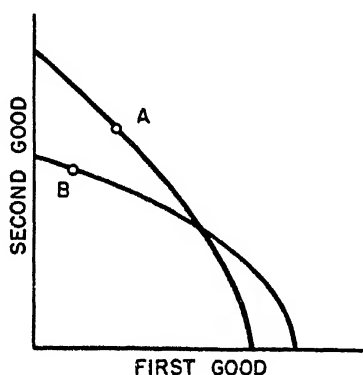
16. This completes the problem of making group inferences from simple index-number comparisons. At the non-philosophical level there are still two more grave difficulties to be faced. Up till now I have always spoken of the utility-possibility function of *point A*, not of situation *A*. But the totals of goods at *A* or 2 do not fall from heaven in fixed amounts. Obviously other total quantities might instead have been produced. Therefore, the true utility-possibility function corresponding to situation *A* is really wider and out farther than the one defined for point *A*. At best, if all markets are perfect and there are no external effects or government distortions, the utility-possibility function for point *A* may just touch that of situation *A* at the actual observed point, elsewhere being inside it. The wider schedule is the envelope of a family of schedules corresponding to each *possible* point of total consumption goods. (See Fig. 8.)

Obviously it is the wider possibility function of a 'situation' rather than of a 'point' with which we should be concerned, and before we go throwing

¹ If both individuals are better off in the observed 2 point than in the observed 1 point, how reasonable it seems to counsel that the switch be pulled. And if the only alternative were these two situations, almost all old welfare economists might agree. But this need not be our choice of alternatives at all. Realistically, the choice may be between these two points and a third ethically superior point that lies on 1's locus. As a matter of tactics and *realpolitik*, one will sometimes want to follow such simple criteria and actually give compensation, or perhaps fail to compensate. But tactics aside, these rules are in principle incomplete.

any switches or making policy decisions we must make sure how alternative production possibilities affect the problem. A few truths continue to remain self-evident, but, generally speaking, this new element makes the problem of definite inference even more difficult—an important but sad fact.

Let us consider an example. Up till now the one unshaken truth that remained was this: If more of every good is observed in point *A* than in point *B*, then *A* represents an increase in potential real national income over *B*. Even this is no longer necessarily valid! Suppose we draw up production-possibility curves showing how much of each good can be produced in total when the total of the other good is specified. Such a chart might look like Fig. 6 except that now the two outputs rather than utilities are on the axes. In Fig. 7 our observed point *A* lies north-east of the observed point *B*, and yet it is obvious that the production-possibility curves can still cross; and it is also obvious, upon reflection, that depend-



FIGS. 7 and 8

ing upon how much people like one good as compared to another, the corresponding utility-possibility curve can most definitely cross—making no unambiguous inference about an increase in potential real income possible.

17. So long as commodities are really economic rather than free goods, this much can be said: *If the production-possibility function of one situation lies uniformly outside that of a second situation, then the utility-possibility function of the one will also be outside that of the other.* In the limiting case where one or both individuals do not care at all for one of the goods, the schedules might just be touching at one or more points. Also it is to be understood that if the total of resources (land, labour, &c.) is not the same in the two situations, these resources are to be treated just like negative commodities, and it is in this sense that one production-possibility function must lie uniformly outside the other.

Hicks attempted in 1940 to explore the relationship between index-number criteria based on price-quantity data and productivity as measured

by the position of the production-possibility function of society. His treatment was brief and much of it he had abandoned prior to Kuznets's 1948 criticisms. But even after the recent exchange of views I do not feel the subject is left in its proper state. To analyse the problem in its entirety would be too lengthy a task, but a number of observations are relevant to our discussion. In all that follows I shall assume that there are no excise taxes, so that the irrelevant distinction between income-at-factor-prices and income-at-market-prices can be disregarded.

Under this last assumption, would the same $\sum pq$ tests relevant to indicating a (1940-defined) increase in welfare also serve to indicate a shift in productivity? One is almost tempted to read such a belief into the following passage:

'If competition were perfect, and if state activities were so designed as not to disturb the *optimum* organization of production, marginal utilities and prices and marginal costs would all be proportional, so that the same valuation which would give us the social income as a measure of economic welfare would also give us the social income as a measure of productivity.'¹

Kuznets objected to all this on the grounds that production-possibility curves, unlike indifference curves, can intersect and can be of variable curvature. His instinct that something is rotten in Denmark may be a sound one, but the precise trouble has not really been isolated, nor a worse difficulty brought to light.

In the first place, there is no need for an individual's indifference curves always to be concave: he need only be assumed to be in equilibrium at the observed points. In the second place, it is untrue that collectively defined indifference curves (*à la* Scitovsky or otherwise) are forbidden to intersect and cross. Our earlier discussion of the points *A* and *F* may be referred to in this connexion. Neither of these two reasons can serve to isolate the basic difficulties of making production inferences.²

¹ *Economica*, 1940, p. 122. Hicks goes on to say, parenthetically: 'It would not be very reliable as a measure of productivity, but it might usually satisfy the productivity tests for small displacements, over which the substitution curves might not differ very much from straight lines.' To make the only comparisons between different situations that are valid, this last linearity assumption can be shown to be unnecessary; but it foreshadows Hicks's later desire for an approximate representation of the production-possibility function in the neighbourhood of an observed optimal point. A straight line gives, under the assumed conditions, an upper (rather than a conservative, lower) bound as to what is producible.

² Kuznets has a third objection which has little or nothing to do with the problem here discussed. Working by analogy with the consumption problem, he makes the strange and unnecessary assumption that a perfect price system is in some sense maximizing 'producers' surpluses', and he raises the question whether specificity of some resources may not make it impossible for every producer to be as well off as previously. Both Hicks and I would consider producers and consumers to be the same units, who buy goods and also sell services; all such services can be treated as negative goods and all ordinal disutilities treated along with ordinal utilities. Firms (corporations) provide the place where producers work but themselves have no welfare feelings, although their owners' welfare is important. The problem at hand is what we can or cannot say about the production-possibility functions of *society* in two situations.

In the production or firm field we have an institutional difficulty absent from the household markets: few families act like monopsonists, but many, if not most, firms sell in markets which are less than perfectly competitive. Let us waive this difficulty for the moment and assume that technological and market conditions are most suitable to perfect competition: namely, constant-returns-to-scale prevails and there is 'free entry'. In this case, any observed point of total output—such as A or 2 in Fig. 1—would represent a *maximum* of $\sum p_2 q$ subject to all the production possibilities of the situation. Geometrically the straight line running through A can never be inside the true production-possibility schedule.

Does this mean that the criterion $\sum p_2 q_2 > \sum p_1 q_1$ in Fig. 1 assures us of *both* of the following: that 2 is better than 1 in *welfare*, and 2 is better in a *production-possibility* sense than 1 ? It must *not* be so interpreted. The production problem involves a certain *maximum* condition, the consumption case a related *minimum* condition. The same index-number calculation can never serve as a crucial indicator for the two problems: if it is a reliable criterion for welfare, it tells us nothing about production; if it has unambiguous production implications, then welfare inferences are impossible.

There are essentially only four possible cases that have to be considered: a comparison of A and C in Fig. 1, of A and D , of A and F , and the almost trivial case of A and B . In this last case, where the A situation has more of every good than the B , we know immediately that the production-possibility function of A lies outside that of B in the neighbourhood of both observed points, and we also know that A 's utility-possibility function (defined narrowly for the points rather than broadly for the situations) lies everywhere outside of that of B . All this is obvious, so we can concentrate our attention on the three other possible comparisons. To keep the notation simple we can always give the point A the number 2 and give all other compared points the number 1 . Our cases, then, are as follows:

	Concerning 1910 def. of welfare	Concerning position of production-possibility function (p.p.f.)
Case A (or 2) and C (or 1): $\sum p_2 q_2 > \sum p_2 q_1$ tells us $\sum p_1 q_2 > \sum p_1 q_1$ tells us	2 better than 1 nothing	nothing p.p.f. of 1 outside of p.p.f. of 2 near point 2
Case A (or 2) and D (or 1): $\sum p_2 q_2 < \sum p_2 q_1$ tells us $\sum p_1 q_2 > \sum p_1 q_1$ tells us	nothing nothing	p.p.f. of 1 outside of p.p.f. of 2 near point 1 p.p.f. of 2 outside of p.p.f. of 1 near point 2
Case A (or 2) and F (or 1): $\sum p_2 q_2 > \sum p_2 q_1$ tells us $\sum p_1 q_1 > \sum p_1 q_2$ tells us	2 better than 1 1 better than 2	nothing nothing

Under the present assumptions we can make inferences about the shifting of production-possibility functions that are no less strong than those about welfare. We can never hope to infer from index-number tests that one production-possibility curve has shifted *uniformly* with respect to another—but then we have earlier seen that we can never hope to make such welfare inferences either. It will be noted from the table that where light is thrown on productivity it is withheld from welfare, and vice versa. This might almost seem to offer comfort: we seem always to be able to say *something* about any situation. But, alas, this is an illusion.

The Impossibility of Unequivocal Inferences

18. Even that which we have in the field of welfare indicators is to be taken away from us now that we have enlarged our alternatives to all the production possibilities of each situation rather than to the single observed points. *We shall never be able to infer a genuine change in potential real income as I have earlier defined the term*—no, not even in the simplest comparison of *A* which shows more of every good than the point *B*. (This was already shown in Fig. 7.) Unsatisfactory as the 1940 definitions of welfare were, we are tempted to beat a hasty retreat back to them. But to no good purpose: even these fragile reeds are blown down by the new winds.

Specifically, the observation $\sum p_2 q_2 > \sum p_2 q_1$ no longer implies that the utility-possibility function of *situation* 1 lies inside that of *A* even in the neighbourhood of the point 2, or anywhere at all for that matter! The whole 1940 proof by Hicks—as supplemented in my earlier lengthy footnote concerning the box-diagram—breaks down completely. The demonstration fails, the argument no longer leads logically to the desired conclusion. By itself this does not show that there may not be found some different proof. However, the theorem can be proved to be false, so that no valid alternative proof exists.

A single example provides a decisive exception to the theorem (that we can infer a local shift in the utility-possibility function). The point *F* in Fig. 1 has a utility-possibility curve which may be almost anywhere with respect to that of *A*, as far as anything we know. There is no reason why it could not always lie outside of *A*'s; there is also no reason why the point *F* should not lie on *C*'s production-possibility curve; there is also no reason why the utility-possibility function of the general situation *C* should not be close to or identical with the utility-possibility function of the point *F* (except possibly at the observed point *C* itself). It follows that we can easily imagine the utility-possibility function of the situation *C* to lie *above and beyond* the observed point *A*—which contradicts the Hicks-like theorem that situation *C*'s curve must lie somewhere south-west of the *A* point. This example shows that the Hicks's proof remains no longer

valid when it ceases to be simply a question of reallocating a given fixed total in the 1 situation.

The Interrelation between Production and Utility-Possibility Functions

19. Production possibilities as such have no normative connotations. We are interested in them for the light they throw on utility possibilities. This is why economists have wanted to include such wasteful output as war goods in their calculations of national product; presumably they serve as some kind of an index of the useful things that might be produced in better times. Our last hope to make welfare statements lies in spelling out the welfare implications of any recognizable shifts in production possibilities.

A uniform outward shift in the production-possibility function—such as can never be revealed by index-number comparisons—must certainly shift the utility-possibility schedule outward. The converse is not true. An outward shift in the utility-possibility function may have occurred as the result of a *twist* of the production-possibility curve. This is because people's tastes for different goods may be such that the points on the new production schedule that lie inward may be points that would never be observed in any optimal competitive market. An 'observable' point is one which, as the result of some allocation of initial resources or so-called 'distribution of income', would lead to one of the points on the utility-possibility frontier.

In the typical case where $\sum p_1 q_1 < \sum p_1 q_2$, so that we know that the production-possibility function of 2 is outside of that of 1 somewhere near the observed point 2, we should like to be able to say that 2's utility-possibility function lies outside that of 1 in the neighbourhood of the observed point 2. But we cannot. The utility-possibility functions of situation 2 and of point 2 both lie outside the utility-possibility function of the points which are known to lie south-west of the observed point 2 on the production-possibilities diagram. But all such points might turn out to be non-observable ones. Only if an observable point 2 is known to give more of all goods than an *observable* point of the situation 1 can we even infer that situation 2 is superior to 1 in the weak 1940 sense. Index-number data are never enough to provide us with knowledge of two such observable points except in the trivial case (like *A* and *B*) where one point is better in respect to every good, and where index-number calculations are unnecessary to establish the only fact that can be established: namely, the production-possibility function of *A* must lie outside that of *B* near the observed points and the same must be true about the related utility-possibility function.

Under the best conditions of the purest of competition very little indeed

of welfare significance can ever be revealed by price-quantity data alone. Needless to say, with the actual statistical problems in a world of imperfect competition and decreasing costs, observed prices have even less significance as indicators of the shape of society's true production-possibility curve.

Political Feasibility as a Crucial Condition in Welfare Economics

20. The last limitation on the applicability to policy of the new welfare economics concepts is in practice one of the most important of all. It hinges around the practical unattainability of the production-possibility and utility-possibility function earlier discussed. It is not simply that imperfections of competitions are so widespread as to keep society from reaching its optimal production frontier; or that government interferences inevitably cause distortions; or that external diseconomies and economies can never be recognized and computed. All these are true enough.¹

The essential point now to be stressed is that we could move people to different points on the utility-possibility function only *by an ideally perfect and unattainable system of absolutely lump-sum taxes or subsidies*. In point of fact, suppose that, in the simplest case, competitive *laissez-faire* puts us at one point on the utility-possibility function. Then we can only seek to change the distribution of income by a system of *feasible* legislation: e.g. progressive income tax, rationing, &c. All such policies involve a distortion of marginal decisions, some involving great distortions but in every case some distortion. They move us then *inside* the utility-possibility curve. We can pick policies which strive to minimize the harmful effects of redistribution, but in practice we cannot reduce such effects to zero. A 'feasible utility function' can conceptually be drawn up which lies more or less far inside the utility-possibility function, depending upon how Utopian were our assumptions about legislation, public opinion, &c.

All this is shown in Fig. 9. The point *L* represents the imputation resulting from a situation of relatively *laissez-faire*. It is made to lie on the heavy-line utility-possibility function—which it would only do in a very perfect competitive world.

Let us suppose that the tastes and abilities of the two individuals are identical so that we can use similar indicators of their ordinal preferences. But let them differ in their ownership of resources (say land) so that the

¹ They can be thought of as forces keeping us from reaching the true possibility frontier; or if we are in a non-perfectionist mood and willing to compromise with evil, they may be thought of as defining a not-so-far-out but pragmatically obtainable frontier. If the latter interpretation is made, we must be careful to realize that the slopes of the defined frontiers need have little correspondence with market prices, marginal costs of production, &c. As I have earlier pointed out (*Foundations*, p. 221), the constraints under which society is conceived as working are arbitrary and must be given by non-economic assumptions. England's production possibilities would be different if the laws of physics could be disregarded or if we could assume that all workers would do their 'best', or . . . or.

income of U'' is much greater than that of U' , as indicated by the position of L relative to the 45° -line of 'equal income'. In a Utopia there might be some way of redistributing wealth or income that would move us along the outside curve from L to the point of complete equality, E , or even beyond. But in practice the only feasible path that Congress or Parliament could follow would be along the light-line utility-feasibility curve.¹

Space does not permit me to work out the far-reaching implications of this point of view. It is enough to point out here that situation A may have a uniformly better production-possibility function than B , and also a uniformly better utility-possibility function. But a change from B to A might so alter the distribution of market-imputed income away from the 'worthy' and towards the 'unworthy' as to make it an undesirable move from many ethical viewpoints. The *utility-feasibility function* of A may very well cross that of B , so that no statement about potentialities, much less about actualities, can be validly made.

By all means let us pray that feasibilities and possibilities be brought closer and closer. But let us not indulge in the illusion that our prayers have been answered and that we can issue new-welfare-economics prescriptions accordingly.²

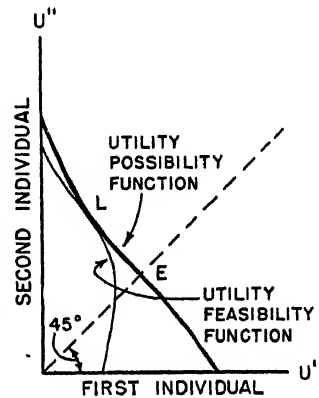


FIG. 9

Final Summary

21. This has been a long and closely reasoned essay. A brief summary may pull the threads together.

1. Certain $\sum pq$ calculations tell us when a single individual has improved himself.

2. The only consistent and ethics-free definition of an increase in potential

¹ A strong ethical equalitarian would have to reckon with this fact; and unless his social welfare functions had complete L -shaped corners along the 45° line, or even bent back *à la* Veblen and like the dog-in-the-manger, he would find his feasible optimum at some distance from equality of incomes. All this has a bearing, I believe, on the debate between Meade and Kahn as to whether rationing and food subsidies ought necessarily to be rejected by rational equalitarians in favour of greater reliance on income taxes or other more orthodox devices.

² A few comments on the cited Little article on 'Foundations' are perhaps in order. There is much I agree with in this paper, and much I do not yet understand. His semantic jousts with the post-Kaldor school falls under the first heading; his analysis of the meaning of a *social or economic welfare function* under the second. The part of his paper that is most relevant to the present technical discussion is his proposed 'foundations' for a 'system' of welfare economics. In my present understanding of it—still admittedly vague—Little has stated a few theorems of one type. These are understandable in terms of the language of a welfare function, and are more in the nature of one arch or wing of a structure than its foundations. The technical content of the theorems is discussed in the last footnote of the appended Pigou note.

real income of a group is that based upon a uniform shift of the utility-possibility function for the group. $\sum pq$ calculations based on aggregate data never permit us to make such inferences about uniform shifts.

3. The condition $\sum p_2 q_2 > \sum p_2 q_1$ does tell us that the utility-possibility function of the *point* 2 is outside the utility-possibility function of the *point* 1 somewhere near 2. It is not acceptable to define this as an increase in real income for a number of reasons, not the least being that we may end up with 2 defined to be both 'better' and 'worse' than 1.

4. Scitovsky and later Kuznets have suggested a partial strengthening of the earlier definitions of superiority so as to rule out certain revealed inconsistencies. But even these two-sided requirements are not stringent enough; when made infinite-sided, as they must be to avoid inconsistency or implicit ethics, they become equivalent to the definition based upon a uniform shift of the utility-possibility schedule. And even when this rigid definition is realized, we cannot properly prescribe complete policy prescriptions without bringing in ethics.

5. When we come to make inferences about two *situations*, each of which involves a whole *set* of production possibilities rather than about just the observed *points*, even the limited welfare inferences of point 3 break down completely. Under the most perfect conditions suitable for pure competition (where the production-possibility curve can never be concave) a few inferences concerning the local shifts of the production-possibility schedules are possible: e.g. $\sum p_2 q_2 < \sum p_2 q_1$ implies that 1's production-possibility function is outside 2's in the neighbourhood of the observed 2 point.

6. The inferred shifts of production-possibility functions are not enough to permit similar inferences about the utility-possibility functions. This is because that portion of a production-possibility curve which has clearly been revealed to be inside another or 'inferior' may (for all we know) consist entirely of 'unobservable points' that have no correspondence with the truly observable points along the related utility-possibility frontier.

7. The utility-possibility functions defined above are not really possible or available to society; they would be so only in a Utopian world of 'perfect' lump-sum taxes and other ideal conditions. Depending upon how optimistic our assumptions are, we must think of society as being contained within a *utility-feasibility function* which lies inside the *utility-possibility function*. At best these are close together in the neighbourhood of the 'points of relative *laissez-faire*'. Other things being equal, redistribution of income will usually involve 'costs', which have to be weighed against the ethically defined 'advantages' of such policies.

8. All this being true, we come to the paradoxical conclusion that a policy which seems to make possible greater production of all goods and

a uniformly better utility-possibility function for society may result in so great (and ethically undesirable) a change in the imputation of different individuals' incomes, that we may have to judge such a policy 'bad'. Such a judgement sounds as if it necessarily involves ethics, but it may be reworded so as to be relatively free of value judgements by being given the following interpretation: A policy that shifts society's utility-possibility function uniformly outward may not at the same time shift the utility-feasibility function uniformly outward, instead causing it to twist inward in some places. One last warning is in order: to define what is feasible involves many arbitrary assumptions, some of them of an ethical nature.

The above analysis enables us to appraise critically Pigou's important definitions of real income; this has been reserved for a separate appendix, which—except for a few cross-references—is self-contained.

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A NOTE ON PIGOU'S TREATMENT OF INCOME

1. Despite the vast efforts of government agencies and bureaux in the last 20 years, Pigou's *Economics of Welfare* remains the classic discussion of the definition of real national income. Our previous analysis permits us to make a rapid critique of his masterly analysis. Even if I am right that certain of his formulations need minor amendment, his conclusions for welfare economics remain untouched. Pigou's principal theorem—that each resource should have equal marginal (social) productivity in every use, with price everywhere equal to marginal (social) cost—does not depend for its demonstration upon the elaborate discussion of the national dividend in Part I. In these days, when the national income approach is all the rage as a pedagogic device for coating the pill of elementary economics, it is worth noting that Pigou had seized upon this method of exposition more than a quarter of a century ago. Whether it would have been possible for him to have side-stepped completely the introductory discussion of real national income is irrelevant, since by choosing not to do so Pigou was led to make substantial contributions to the modern theory of economic index numbers (of the Konus, Bowley, Haberler, Staehle type).

2. According to Pigou, economic welfare is 'that part of social welfare that can be brought directly or indirectly into relation with the measuring-rod of money'. The national dividend or real national income is 'the objective counterpart of economic welfare'. Pigou would like to adopt the intuitive position that the dividend should be a function of objective quantities of goods alone, and not depend on 'the state of people's tastes'. But since (a) there is not a single commodity, and (b) all commodities do not move in the same proportion, or (c) even all in the same general direction, Pigou reluctantly considers such an objective definition not feasible, and settles for a more subjective definition according to which *the real income of any person is said to be higher for batch of goods II than for I if II is higher up on his indifference or preference map.*

These are not his words but my interpretation of them, expressed so as to be theoretically independent of any relationship with money or market-price behaviour. Pigou's exact statement for the case of a single individual is as follows:

'Considering a single individual whose tastes are taken as fixed, we say that his

dividend in period II. is greater than in period I. if the items that are added to it in period II. are items that he wants more than the items that are taken away from it in period II.' (*Economics of Welfare*, 4th ed., p. 51.)

The wording is cast in a comparative form to pave the way for consideration of the more complex case of many individuals where it may be especially difficult to ask people about their wants and desires and theoretically difficult to define what is meant by the *wants* of the group. Pigou extends his definition further:

'Passing to a group of persons (of given numbers), whose tastes are taken as fixed and among whom the distribution of purchasing power is also taken as fixed, we say that the dividend in period II. is greater than in period I. if the items that are added to it in period II. are items *to conserve which they would be willing to give more money than they would be willing to give to conserve the items that are taken away from it in period II.*' (Ibid., pp. 51-2.)

For the moment let us accept the assumption of constant tastes and 'distribution of purchasing power' and the assumption that people know their own minds and correctly identify *ex ante* desire with *ex post* satisfaction. Pigou then gives another verbal reformulation of his definition, saying that the dividend is higher in period II than in I if 'the economic satisfaction (as measured in money) due to the items added in period II is greater than the economic satisfaction (as measured in money) due to the items taken away in period II' (p. 54). Under the assumptions stated, Pigou believes this method of definition to be 'the natural and obvious one to adopt' (p. 52).

3. I wonder. One can sympathize with the attempt to introduce into the definition something that a statistician might sink his punch-cards into, but has the introduction of money left the problem unambiguous? I have repeated the definition to myself aloud again and again: and yet even in the case of a single consistent individual about whom unlimited data were available, I would still not be sure how to proceed.

Pigou himself, according to my interpretation of his various writings, is also put in an ambivalent mood by his definition. In the next chapter he proceeds to work with index-number expressions of the form $\sum pq$ where the p 's and q 's are observed market data. To my mind this is a perfectly valid procedure in the case of a single individual (and it can be given a measure of validity for the case of a group along the lines indicated in my present article). But it is not at all clear that Pigou regards his own procedure as really valid. Again and again he states that the proper procedure is to measure the monetary strength of people's desires not by the marginal price data observed but rather by some kind of consumers-surplus type of construction indicating how much they could be made to pay rather than do without the thing altogether.¹

Pigou's definition has for the moment betrayed him, and I am willing to defend his practice against his precept. I suspect that what happened is something like the following: instead of continuing to look for an ordinal indicator of utility, Pigou suddenly caught a glimpse of the butterfly of cardinal utility and set out in hot

¹ Ibid., pp. 57, 59. In his 1945 introductory work, *Income*, p. 13, Pigou still shows a desire to use some measure of consumers' surplus (or total utility) rather than market values. In the 1949 *Veil of Money* he is even more explicit in insisting that the relative weight of goods should in principle depend upon 'how much of their money income people *would have been willing to spend* . . . [rather than on] how much money they *actually do spend*. . . . Weighting by reference to this entails, other things being equal, giving a smaller weight to changes in items of inelastic and a larger weight to changes in items of elastic demand than "ought" to be assigned to them if our object is, as I have suggested it might be, to measure importance by reference to impact on economic satisfaction, given that tastes are constant. Thus at the very basis of any structure we may erect there is an incorrigible flaw. At the best, we shall have to content ourselves with a makeshift measure, what exactly in the last resort it is measuring being ill-defined and blurred' (pp. 60-1). Cf. J. R. Hicks, 'Foundation of Welfare Economics', *Economic Journal*, xlix, 1939, p. 697, for a related criticism of Pigou's treatment of marginal and intra-marginal concepts.

pursuit. But he realized that the difficulties of this approach were more than statistical, necessarily involving all the familiar difficulties of Marshallian consumers' surplus. Whether or not the butterfly is obtainable or of any use once caught, we must take care not to belittle the solid fruits of index-number theory that are in our grasp.

4. What Pigou does establish—on pp. 62-3—is that

$$\sum p_2 q_2 - \sum p_2 q_1$$

means that II is better than I for any consistent individual. The reasoning is exactly that of the *A* and *C* comparison in my Fig. 1. Likewise

$$\sum p_1 q_1 > \sum p_1 q_2$$

would have meant that I was better than II. Pigou prefers to make the comparisons in the more usual Laspeyres and Paasche index-number ratios¹

$$P = \frac{\sum p_2 q_2}{\sum p_2 q_1} \geq 1 \quad \text{and} \quad L = \frac{\sum p_1 q_2}{\sum p_1 q_1} \geq 1.$$

If we treat work and other efforts as negative commodities, our analysis becomes slightly more general.² But our $\sum pq$ expressions may then be zero or negative, so that the method of ratios may be inapplicable even though the proper comparisons can be made in non-ratio form. As we shall see, the use of such ratios has the further disadvantage that it tempts people to attach *cardinal* significance, in an exact or probabilistic sense, to the numerical value of the $\sum pq$ ratios.

5. If both *P* and *L* are greater than unity, II is clearly better than I. If both are less than unity, then I is better than II. If they are numerically almost equal—and Pigou seems to think they often will be—then the measurement of welfare is thought to be fairly definite. When they differ numerically, Pigou would often measure welfare by some kind of intermediate mean between them: because the geometric mean—which is the Irving Fisher so-called 'Ideal-Index'—has certain convenient properties, Pigou accepts it 'as the measure of change most satisfactory for our purpose' (p. 69).

I cannot persuade myself to follow Pigou's use of the numerical value of the *P* and *L* ratios. In the first place, he—along with Kuznets and many others—treats the measures much too symmetrically. When *P* > 1, we already know that II is better than I. If we learn in addition that *L* > 1, we cannot regard this as further corroboration that II is superior to I; at best it serves as corroboration of the fact that we are dealing with a consistent individual.

The case is much different when you tell us that *L* > 1, and nothing else. We have no right to presume that II is definitely better than I. If now you volunteer to us the second bit of information that *P* > 1 also, we cannot regard this as corroboration of an earlier presumption or certainty yielded by the first bit of information. *In its own right* the second fact, that *P* > 1, tells us all we want to know.

With respect to the opposite case, of recognizing when I is better than II, we must attach crucial importance to *L* < 1; and once again the behaviour of *P* is corroboration of nothing, except of the presence of inconsistency and changed tastes.

¹ Pigou lets *x*, *y*, *z*,... stand for *q*'s and *a*, *b*, *c*,... for *p*'s and writes these expressions in the form

$$P = \frac{I_2 x_1 a_1 + y_1 b_1 + \dots}{I_1 x_1 a_2 + y_1 b_2 + \dots} \quad \text{or} \quad \frac{\sum p_2 q_2}{\sum p_1 q_1} = \frac{\sum p_2 q_2}{\sum p_2 q_1}$$

$$L = \frac{I_2 x_2 a_1 + y_2 b_1 + \dots}{I_1 x_2 a_2 + y_2 b_2 + \dots} \quad \text{or} \quad \frac{\sum p_2 q_2}{\sum p_1 q_1} = \frac{\sum p_1 q_2}{\sum p_1 q_1}$$

² Pigou's difficulty concerning an increase in the dividend at the expense of leisure, p. 87, n. 1, could then have been avoided.

6. Looking into Pigou's probability argument, we will find one difficulty that stems from his treating of P and L as symmetrical indicators of welfare. Suppose $P = 3 > 1$ and $L = 0.99 < 1$, and these measurements are known to be perfectly accurate, statistically speaking. Then the testimony of the two measures is contradictory, one being greater and the other less than unity. But P exceeds unity by a greater ratio than L falls short of unity, so that \sqrt{PL} , the ideal-index, is much greater than unity. Pigou would conclude—according to my interpretation of pp. 65–6—that II is *probably* greater than I.

My conclusion would be different. I would say that either the individual's tastes have definitely changed between the periods or that he was not in equilibrium in both situations. This is because $P > 1$ tells me that II is higher on his indifference curves than is I, and $L < 1$ tells me the exact opposite, and that is the end of it. There is no sense that I can see in believing that, because P is much greater than 1, its testimony is in a loud enough voice to shout down the whisper of $L < 1$.

7. Actually all is not lost as far as exact inference from such a case is concerned. We can validly state: $P > 1$ implies that the batch of goods II is higher on the indifference curves that prevailed in period II than is the batch of goods I; and $L < 1$ implies that the first batch of goods is higher than batch II on the indifference curves that prevailed in period I.

It would be tempting to argue that P always measures welfare from the II period's tastes and L always measures welfare from the I period's tastes. This would be quite wrong, as Pigou is clearly aware. If $P = 0.99$ and $L = 3.0$, we most certainly cannot state the reverse of the previous paragraph's conclusions. We cannot even infer anything about inconsistency. By its nature P can only give definite evidence concerning batch II's superiority over I, and L can only give definite evidence concerning batch I's superiority over II.¹

8. The case where $P < 1$ and $L > 1$ is the only one to which Pigou explicitly applies his probability reasoning. As in Fig. 1's comparison of A and E , no certain inference is possible. The unknown indifference curve through A could pass above or below the point E . Now the closer is E to the budget-line through A , or what is the same thing the closer is P to 1, then, 'other things being equal', we should expect that the chance of A 's indifference curve's passing above E would be increased. The same chance would be increased, the more L is reduced towards unity, 'other things being equal'. This is the basis for Pigou's common-sense view that the degree to which $\sqrt{PL} \geq 1$ determines the likelihood of II's being better or worse than I. Between 1928 and 1932 Pigou felt compelled to abandon an argument based upon 'the principle of sufficient reason' that attempted to establish this common-sense conclusion. His reason for abandoning it was not because of any impregnation with the modern tendency among statisticians and philosophers to question arguments based on ignorance or on the 'equal-probability of the unknown', but because of technical difficulties previously unnoticed. I think that some of these difficulties could be side-stepped, but since Pigou is content to abandon his old view, and since I am not enamoured of the principle of sufficient reason, I shall confine my attention to the exact inferences possible.

Consider a point A on an individual's indifference map. Consider the region of all alternative points in comparison with A , A being regarded as II and each of these

¹ In § 5, chap. vi, p. 58, Pigou leans over backward too far on the issue of the inferences possible when tastes have changed. He believes that the best we can hope for is to devise measures giving the correct results *when tastes have not changed*. This is because he thinks that to make the inference that the batch II is better than the batch I on the basis of the indifference curves of II, we must know what the batch I *would have been* if the indifference curves of II (rather than the actual indifference curves of I) had then prevailed. This is incorrect, as can be noted from the above discussion and from the fact that in my earlier Fig. 1 the inference about A and C was independent of the actual indifference-ratio slope through C .

points as I. Consider the contour lines of any symmetric mean of P and L , such as $\sqrt{PL} = \text{constants}$. Also consider the contour lines of $P = \text{constants}$ and $L = \text{constants}$.

Then this much is true: the contour lines $P = 1$, $L = 1$, and $\sqrt{PL} = 1$ all go through A and are tangent to the indifference curve through A . Suppose we use any of the three measures $P \gtrless 1$, $L \gtrless 1$, or $\sqrt{PL} \gtrless 1$ to decide whether A is better or worse than the other point tested. Then the 'percentage of points' for which we got wrong answers by these methods goes to zero as we confine ourselves to smaller and smaller regions around A . Also the probability will approach one, as we confine ourselves to ever closer regions around A , that all three methods will give the same testimony. In the limit as the region around A shrinks, the use of the P criterion in those rare cases when it disagrees with the L criterion will lead to a biased estimate—in that all points under such conditions of contradiction will in the limit be declared to be worse than A , including those points which are really better than A . Exclusive reliance on L in case of contradiction will result in an opposite bias towards declaring all doubtful points better than A . In the limit as the second point is constrained to lie in ever closer regions to A , the use of $\sqrt{PL} \gtrless 1$ criterion will lead to a percentage of wrong decisions that approaches ever closer to zero.¹ These are exact statements about limits.

9. Besides Pigou, other writers such as Kuznets and Little have seen fit to attach significance to the numerical values of the P and L ratios. (Readers not interested in technicalities can skip this section.) Kuznets argues as follows:

Suppose as we go from I to II, both P and L are greater than they are when we go from I to III. Then II is 'generally' better than III, provided that the shift in prices from II to III has effects on the ratios of certain identical quantity aggregates of an [allegedly] usual sort.²

It will be noted that Kuznets is attempting to use certain numerical or cardinal comparisons for the sole purpose of arriving at a purely *ordinal* comparison. There is nothing methodologically objectionable about this; but none the less the Kuznets result is a self-contained truism that does not permit us to make any general inferences of certain validity in any empirical situation.

First an example may illustrate the loopholes in Kuznets's results. Back in my Fig. 1, let us consider the three points A , B , C . Kuznets will find that P and L computed for A and B are *exactly* the same as for A and C . According to his theorem, C and B should be equally satisfactory or approximately so. Actually the indifference curve through C passes above that of B , and if there were any sense in speaking of 'well above' we might use this stronger expression. More than that, by moving C south-west a little or B north-east a little, we could arrive at the even falser presumption that B is better than C .

There is nothing faulty about Kuznets's arithmetic or the truism he derives from his substitution. He would have to say in this connexion: 'My proviso about price-quantity correlation has been violated in the example.' And why should it not be? When Kuznets says that P is 'in general' less than L , he does not mean by the words 'in general' what a mathematician means when he says that the two sides of a triangle are 'generally' greater than the third. Kuznets means, I think it is clear, that *usually* the price-quantity correlation will be such as to make P less than L . (Actually a long line of writers in index-number theory fell into the actual error of thinking that $P \leq L$ and between them lies some 'true' value; an almost equally

¹ Mathematically, the indifference curve through A is tangential to the $P = 1$ and $L = 1$ contours, lying 'half-way' between them. The contour $\sqrt{PL} = 1$ also has their mean curvature and is an osculating tangent to the indifference curve, differing only in its third and higher derivatives. See my *Foundations*, p. 148.

² This is my brief transcription of Kuznets's Appendix, *Economica*, 1949, pp. 124–31 and his remarks on p. 5.

long line of writers have pointed out the falsity of this relation.) I venture the conjecture that Kuznets formed his belief concerning the usual or normal numerical dominance of L over P from considering the special case where there are no real income changes and where any increase in the price of a good (or set of goods) is followed by a necessary decrease in its quantity. But it is precisely when we are trying to arrive at an estimate of whether II is better or worse than III that we must not beg the question by assuming that they are on the same indifference locus.

Even in a loose probability sense, it would be dangerous to say that P is usually less than L . If all goods had an income elasticity of exactly one—so that a pure income change resulted in proportionate changes in every item of consumption—then this would be a certainty. But so long as the well-attested Engel's laws and observed budgetary patterns hold, we must *certainly* have a reversal of the P - L relations throughout the area between the income-expenditure curve through A and the straight line joining A to the origin. This shows that my ABC example is not an isolated case, but is typical of what will always be true in some region.¹

10. So far I have discussed only the single-individual aspects of Pigou's treatment of real income. All these pages of the Appendix were necessary to cover what took scarcely more than a page of my main text. But now I must consider Pigou's analysis of national income in its group-welfare aspects. Because this problem was treated so fully in the main text, my treatment here may be rather brief.

It will be recalled that Pigou regards his inferences as being valid if the members of the group always have 'a fixed distribution of income' (and, of course, unchanging tastes). When we subject his book to microscopic examination, two questions immediately come to mind. (1) Exactly what is meant by 'a fixed distribution of income' between two situations? And (2) even after this by-no-means-simple question has been adequately disposed of, what is it that Pigou thinks is true of the group or of the individuals in the group as we go from one situation to another? Is there a group-mind that registers more utility? Or is it the algebraic sum of utility that has gone up for the group? Or is it that every single member of the group is now better off than before?

11. One must read between the lines to answer these questions—at least, I have not been able to find their explicit answers. I suspect that Pigou does not have any place in his philosophy for any group-mind. But his technical argument seems to come very close to the following Wieser construction:

'The theory of the "simple economy" . . . begins with the idealizing assumption that the subject is a single person. However, we do not have in mind here the meagre economy of an isolated Robinson Crusoe . . . [but] the activities of an entire nation. At the same time millions of people are regarded as a massed unit.'²

We may read elements of this general line of reasoning in Pigou's concern with the question of whether market prices can be considered as given to society in the way that they can be assumed to be prescribed for a single small competitive individual. If Fig. 10 applied to a single individual, he could legitimately regard the straight line NN through A as being open to him. But if the chart holds for society, there could be shown on it the true (but possibly unknown) production-possibility or opportunity-cost curve of type MM or of some other shape.

Pigou is uneasy about applying the argument to the group as a whole. 'But, when it is the whole of a group, or, if we prefer it, a representative man who shifts his consumption in this way, it is no longer certain that prices would be unaffected' (p. 61). For a moment, Pigou seems to lapse into the assumption that the representa-

¹ Little gives a probability interpretation of the significance of the cardinal size of P on pp. 46-7, *Economica*, 1949. He has in mind a closely related, but distinct, group inference from that discussed in this paper. He also relies on our rough empirical knowledge of preference patterns in evaluating his probabilities.

² F. v. Wieser, *Social Economics* (1927), pp. 9-10.

tive man knows that he is an image of the group and therefore acts collusively as if a group decision were being made. The group mind knows that the only choice really open to it is along MM ; therefore in the initial A situation it does not think that C is obtainable; consequently we cannot infer that A has been revealed to be better than C by a deliberate act of choosing A over C . Something like this Pigou must have believed for the moment, else he would not have felt the need to add a 'certain assumption' of paragraph 8, ruling out the possibility that the production-possibility curve of society is like MM , but instead requiring it to show constant slope like NN . It is fortunate that Pigou's argument can be salvaged without making this extraneous assumption—fortunate because I cannot agree with his appraisal of the *a priori* probabilities: 'In real life, with a large number of commodities, it is reasonable to suppose that the upward price movements caused by shifts of con-

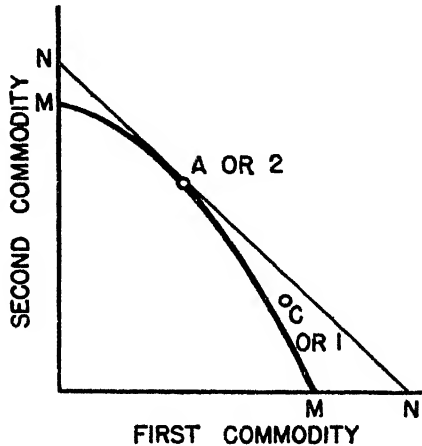


FIG. 10

sumption would roughly balance the downward movements' (p. 62). That is to say, concave or convex curves are equally likely, so we may assume the curve to be a straight line. Rather, I would think that in the conditions most suited to healthy competition—where external economies either balance external diseconomies or both are negligible and where tendencies towards increasing or decreasing returns *to scale* are absent or just balancing—we would still be left with the good old law of diminishing returns in the classical (qualitative and quantitative) senses, so that convex production-possibility schedules are the 'normal' case.

Actually, if Pigou is concerned to make normative statements about points like A and C that hold valid for groups, it does not matter that the true production-possibility curve is something other than NN .¹ We have seen in Hicks's paper and in the text what these valid inferences are. Another way of looking at the problem is by means of the 'collective indifference curves' that Professor Scitovsky has taught us to use in the second of his cited papers.

12. But first we must settle what is meant by Pigou's 'fixed distribution of income'. How tempting to think of money as being concrete and the distribution of income to be fixed if everybody's money income changes proportionately. But money itself means nothing. If two men each have the same money income and if one likes meat and the other cheese and the terms of trade between meat and cheese

¹ Pigou does not stand alone. 'Unless the groups considered are small in relation to the whole, market prices cannot be considered as constant, and therefore the condition $\sum p_2 q_2 > \sum p_2 q_1$ would no longer indicate that goods of situation I were rejected in favour of those of situation II' (*Economica*, 1949, p. 17).

change, then would Pigou consider the distribution of income to have remained fixed? Probably not. Moreover, if we follow the convenient practice of treating the services of labour and property that people supply as negative commodities, then in the absence of government taxes we might say that everybody has a zero (net) income *always*.

Probably in the beginning Pigou had in mind the simple case of identical individuals, any one of whom is representative, and where they all fare alike. Then when situation II is better than I, it is also true that both individuals are better off. When we leave the case of perfect symmetry, it becomes difficult to say that the extra welfare of one man is always to be some fixed multiple of the increment of welfare of another since this involves ethical inter-personal comparisons that Pigou is trying to avoid in these chapters dealing with the relatively objective aspects of welfare and the national dividend. But for his purposes Pigou needs only to assume that the ordinal well-being of all individuals are required to move always *in the same direction* according to some prescribed relationship. [Some complicated monetary shifts must be assumed to take place to bring this about.]

If I am right in this interpretation, then the comparison of A or 2 and C or 1 in terms of

$$\sum p_2 q_2 > \sum p_2 q_1$$

is immediately obvious and independent of the shape of MM or of any assumptions of group-consciousness. The fortunes of all being linked, any one person reflects the fate of all. Now, obviously, for some one person we must have

$$\sum p_2 q_2 > \sum p_2 q_1,$$

because if the opposite were true for each and every person, how could the totals show this relation? But if at least one has been made worse off in I than in II, then the 'fixed distribution of income assumption' means that they must all have been made worse off. Q.E.D.

In terms of Scitovsky indifference curves, the story runs as follows: For a prescribed amount of both people's ordinal utility, U' and U'' , we can draw up a collective indifference curve. For any prescribed distribution linking U' and U'' in a monotonic fashion we can draw up a family of collective indifference curves. If each person has concave indifference curves, the collective curves will also be concave. But regardless of concavity, the collective curve through A is never permitted to cross below the NN line. This will be obvious to every reader in the case of concave curves; and the same can be shown to be true in general by simple mathematical argument. It follows that C lies on a lower collective indifference curve than A —*regardless of the true shape of society's production-possibility curve MM .*

13. Pigou's argument has been removed from any dependence on constant (opportunity) cost assumptions. But a worse restriction remains. For him to make any inference, *everybody* in the community must have been made better or worse off. The wind scarcely ever blows that brings good to absolutely everyone. Lucky it is that the remaining fifty-odd chapters of the *Economics of Welfare* do not depend in an essential way upon the results of the early chapters of Part I dealing with the national dividend. Fortunately, too—just as was seen to be true when tastes change—we can make some valid inferences when the distribution of income is known *not* to remain fixed. From our earlier analysis we know that $\sum p_2 q_2 > \sum p_2 q_1$ implies that the II's utility-possibility curve lies outside of I's at least in the neighbourhood of the actual observed situation II.

14. One last case not yet considered by any of the writers. Suppose we have given to us certain well-defined ethical notions concerning inter-personal well-being. In the simplest case they can be summarized in a Bergson social welfare function, $W = W(U', U'', \dots)$, with the usual property that anything that helps one man without hurting anyone else will mean an increase in W .

As before, let us observe prices, p , and total quantities for all society, q . And finally, suppose that *the distribution of income is ethically optimal both in situation 1 or C and 2 or A*. What can we now infer from the condition $\sum p_2 q_2 > \sum p_2 q_1$? The answer is that situation A lies higher on the ethical social welfare function than does C.¹

The logical proof of this result is not so easy as I at first thought it would be. This is because our move from C to the better position A need not represent an improvement for all individuals. U' may go down provided U'' goes up relatively more, as measured, of course, by the W function. Hence, when cost conditions change in such a way as to make it optimal to alter the relative 'distribution of income', our earlier argument cannot apply.

To prove that $W(A) > W(C)$, we can use 'social indifference curves'. But they are not the arbitrary ones of the Scitovsky new-welfare-economics type. They are a unique old-welfare-economics set of curves showing the combinations of total goods capable of giving (when all optimal arrangements have been made) equal levels of W . In the 'normal' case, where playing the game of competition can be depended to follow the invisible hand to bliss, these social indifference curves will be concave. It follows that whenever C lies inside the straight line NN going through A, it must also lie inside the social indifference curve (of equal W) going through A. This proves our result.²

¹ This is related to Bergson's interesting interpretation of Pigou in infinitesimal terms. Bergson, 'Reformulation of Certain Aspects of Welfare Economics', *Q.J.E.*, li (1938), p. 331.

² In the last two of his cited papers Little has stated theorems a little bit like the one above. There are two or three different versions, but the typical Little theorem shows that a certain point A is better than another point C because we can imagine going from C to A in two steps: one of these involves an improved distribution of real income (somehow defined) and the other an improvement in each and every person's well-being. I give an abbreviated interpretation of one of the variants discussed in *O.E.P.*, pp. 235-7.

1. Suppose we have a W function as defined above, with $\partial W / \partial U' > 0$, &c., and start at a point C and end up at a point A.
2. The point A is assumed to lie out and beyond the utility-possibility locus of the point C; e.g. there is a point C' on the latter locus that is south-west of the point A in the $U'-U''$ plane. Thus the Scitovsky test is satisfied.
3. Now make the assumption that in terms of W 'the distribution of real income is better' at C' than in C. (Thus, ideally, we should not have been in C in the first place.)
4. Then it follows that A is higher on the assumed welfare function than is C. (This conclusion does not depend upon whether the Hicks-Kaldor test is satisfied.)
5. It does not follow that a little angel, given the choice of throwing a switch that moves society from C to A, ought to throw that switch. There may be an infinity of points on C's locus still better than A. Little's policy conclusion is to be qualified, therefore, by the following statement that he has been kind enough to send to me in private correspondence: 'The shift from C to A ought to be made if the shift does not prejudice any other move which might result in a position still more favourable than A.'

The chain of reasoning involved in 1-4 is simple once we pin down what is meant by 'the distribution of real income being better'. This means $W(C') > W(C)$. Since the Scitovsky test implies $W(A) > W(C')$, the Little result $W(A) > W(C)$ immediately follows. Just as Little talks prose, he can be said to be using a *welfare* function whenever he talks welfare economics. But like the new welfare economists, he wants to see what results he can get with an *incompletely* defined welfare function—a commendable effort, perhaps useful for an important class of policy decisions, but necessarily not complete for all policy situations.

MEASUREMENTS OF EFFICIENCY

By L. C. HAWKINS

(Member of London Transport Executive)

I HAVE been asked to speak to you,¹ from the point of view of one who has been associated for many years with the administration of a large public corporation, about the need for measurements of efficiency in the management of an industrial undertaking and the methods by which these measurements are in practice applied. The task is not an easy one, for, as I shall endeavour to explain, the subject is not really a separate one capable of segregation from other aspects of administration. Efficiency tests form part of the process that is going on continuously, and at all levels of responsibility, for controlling the day-to-day work of an undertaking. Detailed tests of efficiency are used by those in control of sectional tasks. More condensed information is required by heads of departments in order that they may assess the efficiency by which those responsible to them discharge their various duties. And information and criteria of a broader character must be available for 'top-management' in order that they, in turn, may keep their fingers on the pulse of the undertaking without being overburdened with detail. It is from the point of efficiency tests prepared and used for purposes of management and administration that I shall approach this subject, and after discussing some of the general principles that are involved I shall ask you to consider, by way of illustration, some simple examples of practical tests that we apply in the London Transport undertaking.

I have also been asked to discuss with you the much-canvassed proposal that the affairs of large-scale industries should be subjected to Economic Efficiency Audits. This proposal has been much talked about but never really explained by its advocates. The only contribution I can make is to analyse the way in which such audits would presumably work, in order that an opinion may be formed on the question whether they would be likely to enhance or impair the efficiency of the undertakings concerned. This, presumably, is the criterion for judging their utility.

While we are concerned with the nationalized undertaking, I am sure our approach will not bear any political colour. Certainly, this will not be so as far as I am concerned.

I. A Consideration of General Principles

The meaning of efficiency. The phrase 'measurements of efficiency' is now in fairly common use. It is expressive. It opens the mind to a process

¹ A paper read to the Society of Incorporated Accountants and Auditors at Caius College, Cambridge, on 1 April 1949. Some modifications have been made in the present version.

that is at once accepted as desirable and, indeed, essential. Industry is seeking continuously to be 'efficient', and if efficiency is the goal, then ways and means of registering the score must be found. The implications of the phrase, and the means by which efficiency can be measured, are not so readily apparent.

The difficulty begins when we consider just what we mean by 'efficiency'. It can be an abstract quality; an impression of competence or capability, readily recognized when a person, or a piece of plant, or an organization, does its work particularly well. It exists without question when a desired result is realized easily, smoothly, and reliably, without fuss or undue effort. In business enterprise efficiency will be affected by personal factors—human relationships, a common sense of purpose, departmental harmony, personal responsibility. Technical qualities will be another governing influence; that is to say, the technical qualities of the means of production that the physical and applied sciences have placed at the disposal of industry, and the use that is made of them in a particular industry. Technical considerations will also affect the operational methods that are followed in the application of the productive processes.

But we are not concerned with the personal or technical aspects of production as such. Our task is to measure, in economic terms, the efficiency with which human, physical, and technical resources are employed for productive purposes. It is economic efficiency we are concerned with. This will depend upon personal factors and technical merit. It will also be affected by the organization and administration of the supervisory function, by the capital cost of plant and equipment in relation to its effective life and output, by the layout of the factory, and by the flow of production through the factory. It implies the avoidance of waste, whether waste of human or mechanical effort, of productive resources, or of physical materials. It involves the production of an article, or the provision of a service, that can be sold, to meet a public demand, at a price the consumer or user is prepared to pay, and one which should yield a profit to the producer when all his costs have been met. All these things are reflected in economic efficiency, which thus becomes effectiveness in securing the greatest product at a minimum cost, to meet a public demand at a remunerative price.

Profitability as a test of efficiency. An ability to earn profits sufficient to give an adequate return on capital employed is often advanced as the crucial test of efficiency in management, provided the rates of pay for the staff, and the conditions of their service, are fair and adequate (a matter usually settled in negotiation with the trade unions) and provided also that the product of the business is sold under, or under the threat of,

competition, in circumstances that enable the consumer to select what he will buy, or what he will use, at the price he is prepared to pay.

It is certainly true that the margin of profit, expressed in ratio to capital employed, is a useful index of economic efficiency. A margin of profits satisfies part, at least, of our definition of economic efficiency. There will have been production 'to meet a public demand at a remunerative price'. But will there necessarily have been production 'at a minimum cost'? Profitability does not answer this question. A balance on the right side of the profit and loss account does not necessarily indicate efficiency in all the processes that have contributed to the two sides of the account. Favourable purchase prices, whether skilfully negotiated or accidental, may obscure inefficiency in manufacturing processes. Profits may be made, in a seller's market, notwithstanding inefficient production, or may be high because of controlled selling prices, in which event the element of competition will be restricted. On the other hand, the manufacturing processes may be efficient in themselves but the profit margin may be small, or even non-existent, because of market or economic conditions which are outside the control of the manufacturer or the provider of a public service. Thus, while profitability may ensure the survival of a concern, it does not necessarily connote efficiency in production.

In the case of public authorities, the effectiveness of the profits test has been challenged with particular vigour because, it is said, the urge to make profits as a prerequisite to survival is removed. This view seems to overlook two facts: one, that the public authorities are usually required to be self-supporting, and the other, that continuity, or survival, whichever word is preferred, is rendered imperative, not by the form of their constitution but by the essential nature of the services they provide.

London's transport, for example, has to go on, whatever form, public or private, the administering body may take, but the London Passenger Transport Board was none the less required to be self-supporting. The urge to achieve this result, consistently with the parallel duties which the Board held to the staff for their rates of pay and conditions of service, and to the people of London for the provision of adequate transport services, was not lessened because ownership and control of the undertaking was vested in a public corporation. A profit margin was not the sole objective, but self-sufficiency was one of the aims.

Again, the British Transport Commission are required, by the Transport Act, 1947, to conduct their undertaking so as to secure 'that the revenue of the Commission is not less than sufficient for making provision for the meeting of charges properly chargeable to revenue, taking one year with another'. The Commission, therefore, must also be self-supporting. Interest on, and the repayment of, the capital stock issued by the

Commission is guaranteed by H.M. Treasury. If the Commission should not be able to meet these obligations the Treasury will pay the stockholders on the Commission's behalf. But there is no provision in the Act that would require the Government to reimburse to the Commission any losses the Commission may suffer on their Revenue Account. There is no statutory provision for a subsidy.

The Transport Act of 1947 does provide machinery by which competitive services can be restricted, but the Act by no means eliminates competition. The use of private cars for personal transport and 'C' licences for domestic freight traffic are some of the more obvious competitors. Even within the Commission's undertaking its operations do not eliminate, though they may lessen, the opportunity for the exercise of 'consumer's choice'.

The degree to which profitability operates as a test of efficiency may vary with different public authorities, but it has certainly not been entirely removed in all of them. The financial results they achieve will be affected, just as in other forms of business enterprise, by commercial considerations and by the detailed efficiency with which the operations of the undertaking are conducted. Profitability, whether in public or private undertakings, affords a useful, though not a complete, index to efficiency, and the profits earned by any business must be studied at short intervals for the purpose of business administration, not only in isolation in respect of a particular period but also in comparison with the results for previous periods. Trend is no less important than up-to-date experience.

Budgetary control. Important as it is to study both the long- and short-term trends of financial results, the results achieved in previous periods can be unsatisfactory as a standard by which to measure current performance. The results may be improving or worsening. Perhaps they should improve, or are bound to worsen, for reason of changes—controllable or otherwise—in the conditions that govern the operations of the concern, changes affecting either sales or costs or both. The important question is whether the improvement, if improvement was to be anticipated, has been as great as it should have been, or whether the worsenment—if worsenment there had to be—was minimized. Where factors of change are present, and they usually are, previous results can be imperfect as a standard for measuring current efficiency and faulty as a basis for exercising judgement.

A budgetary system overcomes these difficulties. The formation of a budget will probably begin with past results. Non-recurrent influences which affected those results must be excluded and corrections made for the anticipations of the future. In this way a forecast will be built up of what should happen in the future, and a standard will be set against which

future results can be measured. The budgetary system thus has considerable merit, provided the budgetary standards are carried right down to departments and sections of departments forming local centres for purposes of control. It is also a system that provides a means of financial control and enforces a review of policy and a definition of objectives.

It would be outside my subject to enlarge on the subject of budgetary control, and I certainly shall not do so except to draw attention to a possible limitation of a budget as a test of efficiency. What is the nature of the questions that are asked when the actual results diverge—as they assuredly will—from the budgeted results? Is the inquiry limited to the accountant's office and directed to the question why the estimates were incorrect? Or is the budget basically sound so that the departmental officers are put on inquiry as to why the budget standards were not realized? The latter approach must be practicable if the budget is to be accepted as a standard for measuring efficiency.

The true objectives of efficiency measurements. But, as I have said, necessary though it is to study at short intervals the trend of profitability, the validity of profitability as a test of efficiency in administration is limited. None the less, there is, so far as I am aware, no other all-embracing standard by which the efficiency of a business can be measured. It is, indeed, scarcely to be expected that means can be devised for expressing, in one simple index, the efficiency of something so essentially complex as the modern industrial organization.

Nor is it easy to envisage an index which could be applied indiscriminately to all undertakings, whatever the nature of their business. It is true the *Economic Survey for 1949* tells us that the nation's production in 1948 was 12 per cent. greater than in 1947. It is true, also, that statistical methods have been worked out for assessing the productivity of industrial units. These statistical exercises are designed to indicate the approximate trend of productivity from period to period—comparisons in time. They might even afford a basis for comparing, within fairly wide limits, the productivity of different undertakings engaged in the same class of business. But indices as broad as these could not have more than a limited use as yardsticks for measuring performance in the day-to-day administration of a business. And that, as I see it, is what we are primarily concerned with. We are concerned not with broad statistical representations of overall productivity but with methods for measuring efficiency in the course of day-to-day administration; methods which will bring into focus financial and statistical reflexes of what is happening in all the different activities that make up the particular business. Such measurements are needed for the information and guidance of those responsible

for the detailed operations of the business. How are they to be provided?

Measurements in physical terms. There is, of course, no such thing as absolute efficiency, using the word in its economic sense. Efficiency is relative, and the word measurement of itself implies a standard. Without a standard there can be no measurement, whether the subject of measurement is a yard of cloth, a ton of coal, or output per man-hour. The problem is therefore twofold. First, there must be an assessment of what is in fact happening, and then there must be a standard with which the assessment can be compared, whether the standard be a similar assessment in a previous period or an assessment in terms of what should ideally have happened.

One method of assessing what is currently happening is a measurement in physical terms; that is to say, a measurement embracing both cost and output, deduced by dividing the units of output into the cost of obtaining it. An instance which a friend recently related to me, out of his long experience, bears directly on this form of presentation. At one time he was associated with a bakery which had branches in many parts of the country. The net profits of one bakery were particularly good, and inquiry showed that this branch, by using a formula of ingredients rather different from that used by the other branches, produced not only better quality loaves but more of them for each sack of flour. The same formula was extended to all the bakeries. Now it was the practice to measure production efficiency by the cost per sack of flour used, and there was consternation when the monthly returns came in and it was found that the index of production efficiency—the cost per sack of flour used—had gone up all the way round. Reflection quickly showed this was bound to be the case, because more loaves had been produced, and more loaves had therefore been baked, for every sack of flour that was used. So the efficiency measure was changed to the productive unit—the cost per baker's dozen of loaves produced—and the new statistic quickly showed that the concern had not only improved their efficiency but also their method of measuring it!

Indices that relate costs to units of work done, or to units of output, automatically take care of two crucial questions: what was spent and what was obtained for the expenditure? They are probably the form of measurement most commonly applied to the efficiency of industrial operations. They are simple to understand and usually easy to compute. By tracing movements in the indices from period to period—comparisons in time—they can be used to disclose trend, and they can frequently be related directly to selling prices. For comparisons between different undertakings, however, or between different branches of the same business, they

have their limitations and, indeed, can be definitely misleading. So much depends upon the productive resources that are available in the different factories, and upon the bases upon which the costs are compiled. These things must be allowed for before the relative costs per unit of output can be used as a measure of comparative efficiency in different businesses.

Measurements derived from standard costing. And so we come to what, in those cases where it can be applied, is, I suggest, the most effective system of all for measuring efficiency in detailed administration. I refer to what is known as standard costing. It is, I suggest, the most effective system because it begins with the question—‘What ought the cost to be?’ or ‘What are the standards that ought to be capable of achievement?’ That, surely, is the criterion which, above all others, will establish standards for measuring efficiency in actual performance at every detailed stage of production.

Standard costing is impracticable, as you will know, without a pre-determination and planning of the methods and operations by which X is to be produced. In relation to factory operations standard costing is a by-product of what is known as production control, which begins with a planning of the methods of production so as to maximize the productiveness, in terms of output, of the resources that are available. The production engineers must work out in advance the most economical methods of production; economical in effort and therefore economical in cost. They must define the type and quantity of material to be used; the operational methods to be followed; the routing of work in its progress through the factory; and the machines or other tools to be employed for each operation. The man-power and machine capacity required in each shop to meet the anticipated load must be calculated. When all this has been done standards can be set for the quantity of material to be used, and the machine-hours and man-hours to be absorbed, for a given production. As production proceeds the quantities of material in fact used, the machine-hours and man-hours in fact occupied, and the production in fact achieved, can be measured against these standards.

Standard costing is sometimes criticized, as a measure of efficiency, on the grounds that it does not necessarily give a comparison with the limits of performance. This can certainly be so where the standards for labour costs are the time allowances fixed for production bonus purposes. In such cases it is not always easy to adjust the time-allowances in keeping with experience and changing conditions. Everything depends on the standards, but provided they have been properly set there can scarcely be a better test of detailed efficiency.

Standard costing has been developed by some undertakings, as you will

know, to a degree that enables each sectional supervisor to be told, first thing next morning, the man-hours which the output of his section on the previous day should have occupied and the man-hours which were in fact occupied. This is the ideal. It gives the supervisor a day-to-day test of the efficiency of his section, while the facts to which the figures relate are still fresh in his mind, and while there is still time for corrective action to be taken. A picture of overall efficiency can also be built up for use by those at higher levels of responsibility.

This illustration of the practical uses to which measurements of efficiency can be put underlines what should be the true objective in compiling them. Measurement is not an objective in itself, but a means to a much greater end. The true objective is an improved efficiency. Measurement that does no more than satisfy an inquisitiveness has a very limited value. Measurement is justified only when it assists in the struggle to attain a greater efficiency. It can do this by disclosing where waste in any form is occurring, or by indicating where greater effort or other remedial measures are needed. This is the standard by which the efficiency of the measurements, and the cost of obtaining them, must be tested.

The necessity for planning the productive operations as a prerequisite to standard costing emphasizes another underlying essential to work in this field. The extent to which a system of efficiency measurements can be applied to different businesses will vary. It will depend upon the layout and administration of the work of the undertaking. An undertaking that sets out to plan the efficiency of its operations will be best able to measure the efficiency with which its business is conducted. If efficiency in operation is planned then the measurement of efficiency will be a natural by-product of the plan and will serve as an aid in attaining the planned efficiency.

The measurement of efficiency—is it a separate function? You may well ask, at this stage, whether there is anything new in this subject with the new title of 'measurements of efficiency'. My own answer would be that there is nothing new, either in the subject or in the application of the process which it implies. Accounting and costing processes have been carried on for these self-same purposes, as part of the internal administration of business concerns, for many years past. What is new is the widespread recognition of the fact that costing data in its widest sense can be utilized for measuring efficiency, which in turn has stimulated an accentuated demand for such measurements.

You may also ask whether the compilation of the basic material for computing indices of efficiency, and often enough the indices themselves, constitute a separate subject. This can scarcely be so, for the measurements of efficiency are usually the product of the normal accounting and

costing processes. The basic data can only be obtained by an assimilation of the mass of detailed transactions that make up the sum of business activity. In the sense in which I am asking you to consider the subject, 'measurements of efficiency' are the utilization, the expansion, the fulfilment of the accounting and costing processes for managerial purposes.

The definition of new indices may well be a subject for special study, for if the indices are to reflect economy in business administration they must bring to life in the minds of those who use them the physical operations and characteristics of the business to which they are applied. The distillation of indices from basic data already available, and the study of the indices when they become available, might also call for separate and specialized treatment. In these respects the measurement of efficiency does become a separate function, and in London Transport we have a separate staff, under an Economic Efficiency Officer, charged with the responsibility for these functions.

II. Some Practical Illustrations

There is, in practice, no stereotyped method by which efficiency can be measured in all undertakings, or in different branches of the same undertaking. What is suitable for one may be unsuitable for another. What is practicable for one may be impracticable for another. Even the extent to which standard costing can be applied is bound to vary between different undertakings, and between different branches of the same undertaking. Each undertaking is a study in itself, according to the nature of its business, its system of organization, and the methods by which it is controlled. None the less it may be of interest to consider some of the detailed measurements that we apply to our London Transport operations, selecting bus operation out of the many different businesses that are really comprised in London Transport. These examples are put forward not as prototypes for adoption elsewhere but as practical illustrations of the principles upon which work in this field must rest. By selecting bus operation I have at least chosen a business which you all know something about, if only as passengers. I might add that a friend of mine once remarked that managing the London Transport undertaking was the most fascinating job in the world, but it had a serious drawback: every single passenger thought he could do the job better than you were doing it yourself!

Example A. Service car mileage. In bus operation the unit of work done is the number of vehicle miles operated for passenger-carrying purposes—what we call 'car miles'. The car miles to be operated are governed by a time-table, or schedule, as it is called, and the schedule thus becomes a standard against which the miles in fact run can be measured. Miles

scheduled to be run, but not run, are called 'lost miles' and are expressed as a percentage of scheduled miles. Here, then, we have a standard, and a measurement, of efficiency.

Example B. Failures and delays. It is important, however, to know not only what mileage has been lost but also why it has been lost. The vehicles may have been mechanically defective, or the operating staff may have been responsible. The number of failures of, and delays to, vehicles in traffic service are therefore tabulated by principal causes. They are also expressed as an average per 100,000 car miles run. The analysis by causes is detailed and of itself directs attention to matters which require remedial action.

Example C. Vehicles owned and in service. Another consideration is the use that is made of the vehicles provided for service operation. An excessive proportion of spare vehicles means idle capital, idle capital invested in both vehicles and garage accommodation. In order to measure efficiency in the use of buses the number of vehicles actually in service is expressed, first, as a percentage of the number scheduled for service, thus measuring the extent to which a given standard has been achieved, and second, as a percentage of the total operating stock, in order to measure what proportion of the available buses is held as engineering or operating spares.

Another important consideration is the number of miles run per vehicle per day. The higher the average the smaller the number of vehicles required for a given service. Moreover, the cost per car mile of many items of expense, for example, licensed vehicle duty, cleaning, inspection, depreciation, and—to a considerable extent—maintenance, will fall with every increase in the number of miles run per vehicle per day. The average number of miles run per vehicle per day is therefore carefully watched; the higher the average the greater the efficiency in the use of the buses.

Example D. Drivers' and conductors' scheduled duties. Another, and certainly not less important factor, is the use that is made of the time for which the drivers and conductors are paid.

Drivers and conductors are paid for a guaranteed working day of 7 hours 20 minutes, making, with 6 shifts, a guaranteed week of 44 hours. There are many other conditions of service which need not be referred to here, but a moment's reflection will show one that it is not possible to get 7 hours 20 minutes' work out of each crew, each day. When the whistle blows at a factory the employees all leave. But a bus crew cannot continue at work until the end of the 7 hours 20 minutes' shift, and then leave the bus wherever it may be. There are recognized relief points at which one crew takes over from another. In such circumstances 'waste' time, or

what is known as 'building-up' time, is inevitable. It represents the difference between the hours actually worked and the guaranteed number of hours—7 hours 20 minutes—that must be paid for.

The importance of scheduling the crews' duties so as to keep this 'building-up' time to a minimum needs no emphasis. An analysis of the scheduled duties is therefore prepared, showing how the scheduled working day is made up.

The number of hours of work that are actually spent by the crews on the vehicles while they are running in passenger service is equally important, for it is only when wheels are turning that the bus can be productive in carrying traffic. Productive running time is therefore expressed as a percentage of total time paid for.

Economy in operation also depends on the number of miles worked by the crews during each term of duty. The greater the number of miles worked by each crew per duty the lower will be the cost of operation per car mile. This, in turn, is affected by the speed of operation. The statistics, therefore, show the average speed of operation and the average number of miles worked per crew per duty.

Example E. Drivers and conductors employed. So far we have considered the work the men do when they are on duty. We now come to the total number of crews employed. The duty schedules show the number of crews that would be employed if every man was available precisely when he was needed. This, of course, is a position that could never be achieved in practice. Cover must be provided for sickness, holidays, and so forth, if gaps in the service are to be avoided. It is therefore inevitable that more crews should normally be employed than are actually at work. Or if there is a shortage of crews, then scheduled miles will not be run and gaps will occur in the services. The number of crews scheduled for duty is thus a standard with which to compare the number of crews on the pay-roll, and the excess is analysed according to causes. The most significant item is the number of crews with 'no work' to do.

Finally, the total cost of drivers' and conductors' wages is expressed as a cost per car mile operated, an index that sweeps into a single figure all the different factors affecting the employment of drivers and conductors, and relates cost to the unit of work done, the car mile, another index of considerable significance.

Example F. Fuel costs. The consumption of fuel in the operation of the vehicles is another expensive element, and it is one that can be affected by the design and maintenance of the vehicles as well as by the skill with which they are driven and by traffic conditions on the roads. Operation by heavy-oil buses is much cheaper than operation by petrol engines, mainly because of the larger number of miles that can be run on a gallon of heavy-

oil. The statistics therefore show separately the miles run per gallon of petrol and per gallon of heavy-oil and the proportion of the total mileage that is run on each. Finally, the total cost is expressed as a cost per car mile.

A word of caution is necessary in regard to the interpretation of this statistic. A fall in the number of miles worked per gallon of fuel does not necessarily imply inefficiency. Fuel consumption increases with speed, and if the higher consumption of fuel is in fact the result of higher speed, then both the number of car miles worked per crew per duty, and the daily number of miles run per vehicle, should be higher. In that event, costs other than fuel will be lower, and there may well be a net economy when all factors are brought to account. This is an interesting side-light on the interpretation of statistics.

Example G. Traffic carried. So far we have considered only the statistics relating to the operation of the vehicles. The operation of the vehicles, however, is only productive to the extent that the vehicles carry fare-paying passengers.

The selected statistics relating to traffic carried begin with the total number of passengers—a sensitive barometer of traffic movement in London.

But the number of passengers carried does not end the matter in its economic aspects. The traffic revenue depends not only on the number of passengers but also on the distance they travel. The fare varies with distance, as you well know. What are known as ‘passenger miles’ are therefore calculated, representing the total number of miles travelled by all the passengers. This statistic reflects the use that has been made of the vehicles by the public, taking account of distance travelled as well as the number of passengers. By expressing it as an average number of passenger miles travelled per car mile worked, an index is afforded of the average loading of the vehicles; that is to say, the average number of passengers on each bus at any one time.

Example H. Traffic receipts. Now we come to the money aspect. What matters at the end of the day is the traffic revenue that is paid in. The traffic revenue is therefore measured in proportion to the unit of work done—the car miles operated—by expressing the traffic receipts in terms of receipts (pence) per car mile. This is done in total for all the services and separately, at regular intervals, for individual routes. The average amount of the receipts per vehicle day is also calculated.

You may ask why we express the volume of travel statistically in terms of passengers carried and passenger miles (Example G) when the monetary index of traffic receipts expresses the number of passengers and the distance they travel, as well as the fares they pay, in a single figure. There

are several reasons. One is that the number of passengers does bring us right down to bedrock: it discloses changes in the number of people that are travelling about London, and also enables us to watch changes in the volume of travel at particular rates of fare—short-distance passengers against long-distance, for instance. Another reason is that the fare scales are not the same for all classes of passengers, or for all forms of transport. Season ticket passengers and workmen pay fares at lower rates than ordinary passengers. The money figures of traffic receipts are thus affected by changes in the distribution of traffic between the different classes, as well as changes in the total volume of travel, and one can obscure the other.

Now, as I have said, these statistical measurements are not complete, even within the limited area of bus operation. They are selected illustrations. Maintenance costs are a particularly important element in the total costs of providing the service, which calls for special treatment. I shall refer to one aspect of maintenance costs presently. In the meantime I will pass to Example J.

Example J. Net traffic receipts. Here we come to the final summation of the financial results of bus operation. The profitableness of the services will in the end depend upon the relationship between traffic revenue per car mile and operating expenses per car mile, and the difference between them, the 'Net Traffic Receipts per car mile'.

Example K. Working expenses per 100 passenger miles travelled. We are experimenting with another index, namely, costs of operation per 100 passenger miles travelled. This is an index which, in a single figure, combines the costs of operation with the productiveness of those costs in terms of the journeys made by the passengers who use the services. It relates costs not to the unit of work done—the car mile operated—but to the actual use that is made of the services by the passengers, and at the same time excludes differences in profitability due to differing fare scales for the various classes of passengers. It should become a useful medium for comparisons between the effectiveness of different forms of transport.

Example L. Overhaul workshops. This example brings us back to maintenance expenditure. It is a simple—perhaps an over-simplified—illustration of a method of measuring efficiency in the employment of the labour force of an overhaul workshop where standard costing is employed. It is not easy to apply standard costing to repair work. We are in the course of introducing a form of it at our bus overhaul works, though its full implementation will not be possible until a much larger degree of standardization has been reached in the types of vehicle to be maintained. The example is as follows:

OVERHAUL WORKSHOPS

*Period:**Notional figures*

WORK DONE IN SHOP X—GROUP Y

	<i>Hours</i>	<i>Per cent.</i>
Time allowed:		
Time allowed for output achieved	2,129	
Allowances for extra work	64	
Per cent. of time allowed . . . . .	..	3.0
<hr/>		
Total time allowed	2,193	
Time taken	1,622	
<hr/>		
Time saved	571	
Per cent. of time taken . . . . .	..	35.2
<hr/>		
Time paid for:		
Time taken	1,622	
Idle time	36	
Per cent. of time clocked	2.2
<hr/>		
Total time clocked and paid for	1,658	
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The above example is a formula for measuring actual labour costs, in terms of man-hours, against predetermined standards. The time which each separate operation should take, called the 'time allowed', is fixed in advance. If the staff are working on a piece-work or bonus system the times allowed are likely to yield, with average efficiency and industry, a given rate of bonus on the time allowed. The total time allowed for the actual output of a particular section during a given period provides a standard against which the time (man-hours) actually occupied can be measured. The percentage which time actually saved bears to time allowed or time taken will determine the production bonuses. It will also express the degree of efficiency which each separate shop has achieved, provided, of course, the time allowances have been properly fixed.

You will see that additions to standard times for extra work or out-of-course work are shown, as also is the amount of idle time. This, again, is a significant statistic, reflecting an out-of-balance situation (if one exists) as between the different shops, or delays in the flow of work through the shops.

The example is related to one group in one section of the factory. Similar measurements would be applied to all sections of the factory.

Example M. A measurement of output. Another interesting possibility emerges from this example, namely, a statistical representation of the total output of the whole factory, for comparison with the cost of obtaining it. Let me go back for a moment. The buses overhauled will

vary in types. Some will be petrol-engined, some heavy-oil. Some will be single-decks and others double-decks. Therefore it is not possible to quantify output by adding up the number of vehicles overhauled. Moreover, the output of a bus overhaul factory will include the repair of the different components that make up a bus: engines, radiators, gear-boxes, back axles, front axles, steering, bodies, and so forth. Many of these components come in for overhaul much more frequently than the complete bus. Output cannot be quantified by adding up the components that have passed through the shops. To do so would be like adding up fleas and elephants, and calling the answer livestock. But the standard number of hours allowed for the work that has been completed can be utilized to give a measure of output. An hour's work, in terms of time allowed, should represent the same volume of output, no matter on what particular component the hour was spent. Each hour of time allowed becomes a unit of output. The repair of a bus body for which one hundred hours were allowed would have the same output value as the repair of an engine for which one hundred hours were also allowed. An aggregation of all the hours allowed in respect of the output actually achieved during a given period would therefore give a statistical measure of the total output of the whole of the factory during that period, no matter how mixed the output may be. This statistical measurement of output can be related to the cost, in terms of man-hours and money, of achieving it, thus affording a means by which the relationship between costs and output can be measured from one period to another, provided changes in method between one period and another—for example, an extended use of machine power—is taken into account. A simple illustration is set out below:

OVERHAUL WORKSHOPS

Period.....

Notional figures

WORK DONE IN SHOP X—GROUP Y

	<i>Current period</i>	<i>Previous period</i>
Total units of output.	175,090	169,500
(Each man-hour of time allowed is assumed to represent one unit of output)		
Total man-hours taken	140,072	138,990
Units of output per man-hour	1.25	1.22
Direct labour costs per 100 units of output	£14.75	£14.86

These, then, are a few examples of the methods we use in London Transport to measure the efficiency with which the undertaking is operated.

I hope they will help you to appreciate not only the nature of efficiency measurements but also the purposes for which they are compiled.

III. Economic Efficiency Audits

Recently a proposal for the establishment of a procedure described as 'Economic Efficiency Audits' has attracted much public notice, and I have been asked to conclude this paper with a reference to it.

The argument, as I understand it, is that the validity of profitability as a test of administrative efficiency has been modified wherever large-scale industries operate under conditions which lessen the impact of competition; that in consequence there is a risk of the public being required to pay uneconomic prices for the services rendered by these industries; that some test of efficiency other than profitability should therefore be applied to the administration of their affairs; and that, by reason of the complex character of their operations, this test can best be applied by a detailed Economic Efficiency Audit by an independent body.

Associated with this argument is the parallel one that public authorities conducting industrial enterprises cannot be expected to account in detail to Parliament for the management of their undertakings, and that some other machinery must therefore be established for securing an impartial review of their administration on behalf of the public, and, once more, that an Economic Efficiency Audit by an independent body would secure this result.

No one concerned with the responsibility for administering a public enterprise would attempt to narrow his sense of accountability to public opinion for the efficiency with which the affairs of the undertakings are administered. The fact that there is no formal machinery by which approval, or 'cover', can be obtained for what has been done or is proposed heightens rather than lessens this sense of responsibility. It used to be said that the London Passenger Transport Board were not responsible to anyone. In fact, they were responsible to the 10 million passengers who then used the services every day, to the 86,000 staff who before the war were employed by the Board, and to the many stockholders who had invested their money in the concern, a personal responsibility if ever there was one.

The public are directly concerned on two main issues: one, the adequacy of the service—using the word in its widest sense—that is provided, and the other, the reasonableness of the charges that are levied for providing the service. Both aspects—service and charges—will be vitally affected by decisions on questions of policy, as well as by economy in detailed administration.

Procedure under the Railway Rates Tribunal. It is interesting to recall how this situation was met in the Railways Act of 1921. Under that

Act rates and charges were to be fixed, with the approval of the Railway Rates Tribunal, so as to yield, with efficient and economical working and management, an annual net revenue of specified amount. These rates and charges were to be reviewed annually by the Tribunal, and the Act laid it down that, if the annual net revenue fell short of the predetermined standard, the Tribunal could modify all or any of the charges so as to enable the companies to earn the standard revenue, provided the deficiency was 'not due to lack of efficiency or economy in the management'. The Railways were thus put on proof, every year, when their fares and charges came under public review, that they had managed their undertaking efficiently and economically. They submitted evidence to the Tribunal year by year to assist the Tribunal in coming to a conclusion on this point.

The fares and charges machinery for the London Passenger Transport Board followed different lines. A local authority could apply to the Railway Rates Tribunal as to a service which had been withdrawn, or the need for new or improved services (in fact, only one such application, and that a minor one, was ever submitted), but there was no provision in the Act for an annual review by the Tribunal of net revenue or economical working, such as that which was required in the case of the Railways. None the less the Board fully accepted the principle that the case for changes in the level of fares must rest upon adequate services, efficiently provided. This was exemplified in 1939, when it became necessary to raise selected sub-standard fares (and reduce others) to the general level, so as to produce a net additional revenue equivalent to no more than $2\frac{1}{2}$ per cent. of the Board's annual gross income at that time. The whole scheme was placed before the Railway Rates Tribunal, although in fact only a fraction of it required such approval. Moreover, in presenting their case to the Tribunal the Board gave an account of their administration of the undertaking, so as to enable the Tribunal to satisfy themselves that the case for higher fares rested on the broad base of adequate services, efficiently administered.

These cases—admittedly now historical—are quoted in order to show that the principle of adequate and efficient service as a condition precedent to changes in the scales of rates and charges is not new. Transport undertakings have in the past appeared before an impartial body where public and industrial interests were represented, by Counsel if desired. They have presented, and been subjected to cross-examination on, their case for alterations in the scales of fares and charges. The Transport Act of 1947 also requires the British Transport Commission to submit charges schemes to an impartial Transport Tribunal.

What would be the procedure if the principle of Economic Efficiency

Audits by an external body were accepted, and what would be the scope of the audits? These questions must be answered before the merits of the proposal can be judged. And when the audit procedure is known a standard must be set for judging the utility of such audits. The criterion, I suggest, should be the extent, if at all, to which Economic Efficiency Audits by external bodies would be likely, in practice, to add to the efficiency with which the industries subjected to audit are administered.

Procedure under external Economic Efficiency Audits. Unfortunately, the advocates of Economic Efficiency Audits have never been at all explicit, so far as I am aware, as to the shape such audits would take. It will therefore be necessary to proceed on the basis of assumptions, which may or may not be correct.

While the audits would be undertaken by a body independently appointed, the constitution and qualifications of the body are difficult to forecast. Accountancy and costing qualifications alone would not be enough. Managerial experience alone would not be enough. Certainly, an intimate knowledge of the working of the industry subjected to audit would be essential, for those undertaking the audit would be required to express opinions on managerial efficiency. Perhaps a composite body, combining different qualities and experience, would need to be selected for this purpose.

The auditorial body, through their representatives, would presumably have unrestricted access to all the records of the undertaking and to their staffs. Whether they would be entitled to obtain opinions from the staff, as well as facts, is not clear.

When the audit was completed the body would no doubt be required to make a report, critical or otherwise. It would seem that this would need to be a documented and reasoned report, probably of some length. It would presumably be published and become the subject of public comment, perhaps parliamentary comment as well as press comment. Unless there were publication there would be no point in an independent audit.

What would be the scope of the 'Audit'? One line of approach might be through the function known as a review of 'organization and methods'. The form of organization, whether in its broadest shape or in detail for the discharge of sectional duties, would presumably come under critical examination, together with the quality of the methods that were followed in the discharge of these duties. Reviews of this kind are of the highest importance in the administration of an industrial undertaking—provided they are made as part of the administrative function. Their character would be changed completely if they were to be made by an outside body, reporting not to those responsible for management but to the world at large. If those making the review reported to and advised the management,

the management would decide the extent to which the advice could usefully be adopted. This is one of the means by which the 'spirit of divine discontent' can be kept alive within an organization and its efficiency be promoted. But if an outside body were to report upon these matters, not to the management but to the world at large, the report would no longer be advisory. Before the auditorial body could report they would need to decide the question whether the organization and methods that were employed were the best that could be devised in the circumstances of particular industries. If they considered other methods or forms of organization to be preferable, it is to be assumed that they would say so—with no responsibility for carrying their proposals into effect or for their consequences. Suggestions for alterations, if they were made, affecting either organization or methods, instead of being discussed and decided within the organization, would become the subject of public comment, including matters which might affect the position of particular individuals. Is it not likely that such a procedure would undermine the authority of the management, and disrupt the organization and the loyalties of those engaged in it?

Another part of the Economic Efficiency Audit would presumably be an examination of financial and statistical data bearing on the question whether there had been economy in administration. How would it be done? Would the outside body be expected to devise and work out data for themselves? Or would they merely use the data which was already available?

For myself, I cannot see how data could possibly be prepared, on any scale, after the event. As I have tried to explain, data for the measurement of efficiency can only be provided by the assimilation of the mass of detailed transactions as they take place from day to day. Efficiency tests are not static. They are keyed up to and move with production itself. I know of no means by which an independent body could prepare such data after the event, or devise standards against which to measure it. The data to be used would therefore, in the main, be data prepared for purposes of current management, not retrospective audit. Data which had been prepared for purposes of a diagnosis, if one were required, would be used for purposes of a post mortem. Even so, its interpretation would call for skill, for experience of the particular industry that was involved, and for a knowledge of the conditions which produced or affected a particular result.

In the course of examining such data it seems inevitable that managerial decisions of the highest importance would come under review, for if results were to be examined causes would also need to be examined. Decisions reached in the light of the situation as it was known when the decision

was taken might easily be criticized in the light of the situation as it afterwards developed. Nothing is easier than 'jobbing backwards'. The considerations which influenced the decision might become public property. The effect of such a procedure on those expected to be progressive in the administration of an undertaking would need careful consideration. Every action they took might become, at some future date, the subject of public criticism and comment, when much fuller knowledge was available than could possibly have been at the disposal of the managers at the time the decision was taken. The effect might well be cramping. How different it would be if the Auditor were required to express his view on policy at the time the decisions were taken, not in the light of after events!

Then, again, in any growing organization, plans for improving its efficiency are always in the process of gestation. Their timing may be of the utmost importance to their success. Or the broad lines of development may be foreseen, but delay in their fulfilment may be unavoidable because of the limiting factors of time and capacity for change. Are all such forward-looking plans to be reviewed and reported upon by the Economic Efficiency Auditor? To leave them out would be to do the management an injustice. To report upon them might prejudice their execution.

Economic Efficiency Audits should be justified by results. The primary test of this proposal for Economic Efficiency Audits by outside bodies is, I suggest, the question whether, by instituting them the efficiency of the undertakings subjected to audit is likely to be improved, or whether, on the contrary, these audits are likely to prejudice the management of the undertakings, and so lower their efficiency. In the latter event the public would be worse off, not better off. A procedure which had been instituted for their protection would have operated to their disadvantage.

It may be that, in endeavouring to foresee the scope of external Economic Efficiency Audits, I have misconceived the manner in which, and the subject-matter to which, they would be applied. In the absence of a definition of the scope of the proposed audits I can only make assumptions. If these assumptions are misconceived, then I shall warmly welcome a definition of what is in fact proposed. But if they are well founded then, for myself, I cannot at present see how external efficiency audits of management, undertaken without responsibility to or for the management, are likely to further the task of management and so benefit the public by an improved relationship of price to service. The opposite seems more probable.

IV. Conclusion

You will appreciate, from what I have already said, that we in London Transport not only accept the principle of efficiency tests; we apply them

and we are continually seeking improved methods of applying them, not as an 'audit'—in fact the term 'audit' is a misnomer if it is applied to internal efficiency tests—but in order that we may watch the economic effects of what is happening all over a complex undertaking, with the object of aiding the pursuit of a still higher efficiency by stimulating self-criticism. This, as I see it, is the purpose of efficiency tests and the justification for their use.

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PRICES AND COSTS IN NATIONALIZED UNDERTAKINGS

By C. A. R. CROSLAND

I

SOME excuse is needed for the appearance of yet another article on this well-worn subject. The excuse in this case is twofold: first, that the recent discussion has centred so largely on the case of the public utility, and too little has been said about the more normal multi-plant industry which may soon form the predominant part of the public sector; and, secondly, that insufficient attempt has been made by economists to translate the conclusions derived from theoretical analysis into recommendations which are general in scope, comprehensible to the layman, and capable of practical application. It is to these two points that this article addresses itself.

The debate of the last few years was initially dominated by the rigid marginalist thesis that the correct rule under public ownership was under all circumstances to equate price with marginal cost. It was natural that the discussion should centre largely on the public-utility case, since it was here (where the existence of significant indivisibilities would often imply decreasing average costs, and where, therefore, the operation of the marginal rules would result in losses being made) that the rule gave rise to its most controversial results. The main attack bore on the assumption that these losses would be met by a subsidy from public funds; and it was argued that such a policy would (a) cause a maldistribution of resources elsewhere, since new taxation would be required to provide the subsidy,¹ (b) cause a redistribution of income in favour of the consumers of this service for which no case on welfare grounds would normally exist, (c) give rise to waste and inefficiency in the subsidized industry, and (d) be out of the question in any case given present levels of taxation and expenditure. It was further pointed out that the 'correct' investment rules in the case of large indivisible plants, involving as they did the measurement of areas under curves, gave no clear or precise guide to policy, so that the whole business would in practice become quite arbitrary. The partial solution to these difficulties which has found most favour is the combination of marginal-cost pricing with a fixed charge to cover overhead costs; but this solution is in practice of limited applicability, and where it is not available a formidable case still lies against the strict marginal rules.

But a number of more general objections have been made to these rules,

¹ Unless these losses were exactly balanced by the abnormal profits of increasing-cost industries, which is highly unlikely (cf. Meade, 'Price and Output Policy of State Enterprise', *Economic Journal*, December 1944).

quite apart from the special problem of the decreasing-cost public utility. First, the whole notion of an exactly determinate 'ideal' output and allocation of resources, from which the marginalist thesis naturally springs, has been challenged¹ on the grounds that the assumptions behind it are so severe as in practice to be somewhat unrealistic; it is not, therefore, worth while to invite great practical difficulties in the interests of an ideal which has little precision in an economy such as our own. Secondly, even if the 'ideal' output were worth striving after, it would not be attained by marginal-cost pricing so long as a large private sector existed in which imperfect competition was general; the 'correct' solution would then be a set of prices in the nationalized industries bearing the same relation to marginal costs as exists on the average in the economy as a whole—an impossible ratio to discover in practice in a dynamic and highly variegated industrial system.²

Thirdly, the losses incurred by strict marginal-cost pricing would spread far beyond the public utilities, since it is likely that many publicly owned plants would be working under conditions of decreasing cost—either because market imperfections will persist even under nationalization,³ or because average prime-costs are constant over all likely ranges or output; any attempt in these circumstances to enforce the marginal rules would lead to a quite ludicrous programme of subsidies. And, lastly, in any nationalized industry which produces differentiated goods, decisions about building or closing down plants, and about whether to undertake or discontinue the production of a particular commodity, will involve an assessment of consumers' and producers' surpluses, and will thus not be related to any criterion which is open to check and supervision.

In my view these various criticisms are so damaging that nothing whatever is left of the conventional case for marginal-cost pricing in every plant in every industry. To pursue an ideal which in practice has little meaning by applying a ratio which cannot conceivably be measured, and in doing so to accept a very widespread burden of losses while throwing over any realistic check on investment—this is a poor policy for the economist to be found urging on the politician and the administrator. What is in fact

¹ Notably by Mr. I. M. D. Little in his recent series of articles and in his forthcoming book. I should add that I am personally most grateful to Mr. Little for the many helpful comments and suggestions which I have had from him in the writing of this article.

² Mr. R. F. Kahn, when he first put forward the idea of an 'average' degree of imperfection ('Notes on Ideal Output', *Economic Journal*, January 1935), made two very simplifying assumptions (universal free entry and a uniform degree of imperfection in each industry); neither of these is in practice fulfilled, so that the task of finding the correct ratio becomes even more impossibly difficult than it seemed at first sight.

³ So that all plants are faced with negatively inclined demand curves. In these circumstances marginal-cost pricing would involve all plants in a loss, and this could only be avoided if, as a second stage, plants were closed down to the point where the demand curves of the remaining plants had shifted so far to the right that they exactly cut the lowest point of their average-cost curves. But there is no assurance (without being able to plot indifference maps) that this might not inflict on consumers a considerable loss of satisfaction.

required is a set of rules which will on the one hand ensure that policy in the socialized sector is in a broad way responsive to changing consumer-preferences (i.e. they must take account of marginal costs where the unit of resources concerned is significantly large, e.g. an entire plant); and which on the other hand will avoid the above deficiencies which follow from a slavish application of the marginal rules to all plants in all circumstances—in particular the nationalized industries must not be a constant drain on the Exchequer, and they must have some clear guide in respect of large-scale investment. The amended price-rules must, moreover, be tolerably simple, comprehensible, and of as general a scope as possible.

II

In the case of the public utilities, these requirements point to the adoption of the two-part tariff where practicable, and otherwise to average-cost pricing (or possibly price discrimination in certain cases). The only exception should be when the divergence between average and marginal cost is enormously large and where neither the two-part tariff nor price discrimination is a practical possibility: there would then be a *prima-facie* case for a limited subsidy of fixed amount.

III

But what of the more general case (much less discussed, but equally if not more important) of the multi-plant industry? (Not, of course, that the public-utility industry necessarily has only one single plant—it will normally have several; but these will be local monopolies, each producing for a separate market and not competing against one another: it is the fact of non-competition which partly identifies them as belonging to a public-utility type of industry.) By a multi-plant industry is meant one in which competition either existed under private ownership (even if imperfectly) or at least was perfectly feasible and was only prevented by (for example) the existence of a market-sharing agreement. It is an industry, in other words, in which a significant cross-elasticity of demand exists between the different plants; in which price-policy must take into account the effective interrelationship of the separate plants; and in which variations in the number and size of plants is not limited by rigid indivisibilities, but is a matter of free and deliberate choice.

Two differences that are important for policy stand out between this type of industry and the public utility. The first is that the problem of the size of the industry and the number of plants is a much more complicated one. In the public utility there is only a limited range of sizes of plant (owing to the indivisibility) and (usually) a fairly well-defined market. The problem of the number of plants is for this reason simpler. Admittedly

the 'theoretically correct' criterion of whether to build or not may be one of great subtlety and intricacy, involving the measurement of areas under curves and so forth. But in practice, whatever precise investment rule is chosen, the decision will be simpler because (a) there can be far less choice in respect of the size of the plant, and (b) there will be less doubt about the size of the market for the output of the new plant, since the product is usually standardized and of very general consumption, and the normally unknown factor of the cross-elasticity of demand between different plants is not present to shroud the market conditions in a blanket of indeterminacy.¹ Moreover, since the indivisibility, if it was large enough to rule out the possibility of competition, must be very large indeed in relation to the market, it follows that the question of new plants, and with it the size of the industry, is one which will less often arise. In the multi-plant industry everything is different and more confused. There is much more flexibility about the size of plant (and similarly about location policy). There is much more doubt about the size of the market and the demand for the output of the new plant, owing to the fact of consumer preferences that shift and waver (except in the limiting case of perfect competition) between the various units within the industry. Moreover, since the size of plant is by definition much smaller than in the public-utility case (not, of course, physically, but in relation to the market), the problem of the size of the industry is bound to present itself more frequently and more urgently. All this, naturally, will vary very much between industries, and there may be cases where the public-utility problem is just as intractable. But, in general, it is likely that the emphasis in the public utilities will tend to be on the right output from a given plant, while in the multi-plant industry it will tend to be on the number of plants. The price rules for the latter case must therefore give very clear guidance on this subject, as well as on the level of output from each separate plant.

The second difference, which follows from the first, is that the concept of output at the margin now becomes a much more interesting one. In the public-utility case, since decisions about entire plants are likely to be less frequent and (in practice) simpler, it was natural to think of marginal cost primarily in short-run terms and from the point of view of a single plant—as the cost to a given plant of producing an additional unit of output. But in the normal multi-plant industry, since the separate units are not independent of each other, and since decisions as to retaining or building

¹ There may, obviously, be considerable elasticity of substitution between the product of the whole industry and that of another industry (e.g. gas and electricity), or even between one part of the industry and another part (e.g. road and rail transport). But there is no complication here at all comparable with the case where the output of a plant has to compete with the near-substitute products of numerous other plants within the same industry. In the first case the demand curve is reasonably determinate, in the second case much less so.

or eliminating whole plants will be more common and more pressing, the marginal unit of resources will more frequently be an entire productive unit (factory, pit, blast-furnace, &c.). The marginal costs that are relevant will thus be marginal costs to the industry in the old-fashioned sense of the average costs of the marginal firm. This is, obviously, a much more interesting notion.¹ Even a very devout marginalist might admit that the notion of the 'optimum allocation of resources', when it refers to small increments and decrements in the output of an individual plant, is not one which inspires in him more than a tepid enthusiasm—apart from anything else, the quantities of factors involved are too small. On the other hand, even those most cynical about the 'ideal' output from a given plant will admit that the question of marginal cost to the industry (as defined above) is a matter of some significance; large quantities of productive factors are involved, whose correct deployment is of obvious importance, and there is at least a *prima-facie* case (despite all the haziness and unreality of many of the welfare-economics assumptions) for a pricing policy directed at covering the cost of these factors. It would be quite wrong, merely because of a very justifiable scepticism about the 'ideal' output, to forget that the marginal approach, *if broadly enough interpreted*, still has *some* value and meaning; and provided, therefore, that this broad interpretation is not open to the same damaging criticisms as the conventional 100 per cent. marginalist solution, we should start off with a strong bias in favour of a price which covers costs in the marginal unit of production, in order to ensure that the broad inter-industrial division of resources is favourable in the sense that no large quantity of transferable factors is being held in the public sector which could give more satisfaction to consumers elsewhere.

One further point must be made before the detailed policy is considered. I shall assume that the Central Board either fixes prices itself, or at the very least has to give the final sanction to the price policies of plant managers. This is contrary to the Lerner picture of entirely autonomous managers operating according to one single rule, but is a necessary assumption for several reasons. The first is that it corresponds to present-day reality. The most common motive for nationalization is in practice not any desire to achieve the ideal output in decreasing-cost industries, but a general belief that greater efficiency will result from public ownership, i.e. that some economy of central planning and control exists. It is most unlikely that a government which has just socialized an industry precisely to secure its central planning and administration will immediately devolve so fundamental a matter as price policy on to a large number of plant managers. Moreover, the present group of nationalized industries is basic

¹ It is, of course, only a perfectly clear notion in those industries where the product is relatively standardized.

to the whole economy in the sense that their prices have an important influence on the general price-level. No government will be willing to relinquish control over so central a group of prices, whose determination has such far-reaching macro-dynamic implications—for wage policy, investment decisions, the balance of payments, and the like.

Quite apart from national considerations such as these, there are reasons internal to the industry for giving to the boards, and not to the managers, the final say in price determination. In all cases where the oligopoly factor is important, the area of indeterminacy will be greatly reduced, and the output decisions of managers correspondingly simplified. (This point is further discussed below.) And, lastly, in the case where some market imperfections persist even under nationalization, central price-control will at least go part of the way to ensure that price and output are in fact responsive to changing consumer-demands. The marginalists always appear to assume an atomistic set-up with a high degree of price flexibility, so that managers must necessarily accept a freely determined market price. In practice, of course, this would rarely be the case. If price decisions were decentralized down to the individual plant, many managers would retain a high degree of control over their prices, and some might be tempted to make monopoly profits or at least fail to respond to a change in demand. This the board could easily detect and prevent. It is therefore an advantage to leave the ultimate control over prices in its hands—not because it is necessarily less immune to the temptations of laziness or monopoly exploitation, but because, being under more effective public and ministerial pressure than the individual manager, it is less likely to succumb.

IV

It will be convenient to divide the multi-plant industries into two types. The first type is that in which the physical product is fairly homogeneous, or in which a number of fairly homogeneous physical products are each produced by several plants in the industry. Then any market imperfection will have been due to oligopoly influence, irrational preferences, or transport costs. The basic sections of the iron and steel trades may fall into this category, as also some (though not all) coalfields, and cement (if and when nationalized). In all such cases, each variety of the product is produced by more than a single plant, and is sufficiently homogeneous for central price-fixing to be quite feasible; thus it is not absurd to consider the market for each variety as (subject to the fact of transport costs) a single one,¹ with no one firm exercising an effective degree of monopoly control.

¹ It is true that there are 8,000 different types of coal, but these divide into a much smaller number of main grades, within which differences are only of size and mode of preparation for the market (hand-picked, washed, or dry-cleaned).

The board will then fix centrally a price¹ for each product, and by so doing will face the plant managers with horizontal sales-curves. Several advantages follow from this. All oligopoly influence on the price is removed, and the managers must dance to whatever tune the board may call. Irrational preferences, even if they persist, no longer allow the manager a control over price which he might be tempted to abuse. All element of indeterminacy is removed from the market situation, and the managers' problems are thereby greatly simplified. And with more than one plant producing a physically homogeneous product at a single price, the level of profits, no longer distorted by irrelevant imperfections, becomes a much clearer guide both to relative efficiencies and to whether each section of the industry is the proper size.

Each plant, then, will have a horizontal sales-curve at the price fixed by the board. The manager should then be told to maximize profits, which he will do by expanding output to the point where price and marginal cost are equal.

But on what principle should the board initially fix the price? It cannot at once choose a price equal to costs in the marginal plant, since to fix the price solely by reference to supply considerations may give a disequilibrium between market supply and demand, leading to queues, allocation schemes, tiresome movements of stocks, &c. The board will therefore initially set a price which balances supply and demand, i.e. which will keep stocks steady at the required level and comfortably permit the whole of current output to be sold without the need to ration consumers.

So a price is set which clears the market, and on the basis of this price managers seek to maximize their profits. The result will be that the marginal (highest-cost) plant makes either normal profits, abnormal profits, or losses. Which of these three occurs will tell the board whether the size of the industry is broadly correct, too small, or too large. It will then expand or contract the industry's capacity until profits are normal in the marginal plant; in other words, it will act exactly as the 'invisible hand' under perfect competition. The final result will be that price equals both marginal cost to each individual firm and also marginal cost to the industry (= full costs of marginal plant). The intra-marginal plants will earn rents.

This seems the obviously advantageous solution: clear directives, financial independence, an element of competition. And with all this, since no plant is failing to cover the entire cost of its transferable

¹ These prices should normally be *ex works*, with transport costs separately calculated and added on, in order to encourage industry (where the product is mainly consumed by industry) to locate itself on the basis of real and not artificial comparative costs. Often, of course, a complete *ex works* price structure will be impossible, and recourse must be had to a zoning system such as the National Coal Board now has under consideration.

factors,¹ there is no considerable quantity of resources which consumers would obviously prefer to be employed elsewhere. The only drawback is one which the fanatical marginalists would consider a positive merit—the fact that price equals not only the full costs of the marginal plant but also marginal cost to each separate plant. The output from any given plant is therefore in excess of the ‘ideal’, since this requires a price based on the average price/marginal cost ratio of the whole economy. However, it has already been argued that the whole concept of an ‘ideal’ output from a given plant is a quite unhelpful one, so that no sleep need be lost over this point.

V

The second type of multi-plant industry is that in which the physical product is not homogeneous. In the extreme case, each plant will be manufacturing a product which is differentiated from that produced in any other plant; in none of the separate markets will price be independent of the output of the individual plant, and varying degrees of cross-elasticity of demand will exist between the different products. The Central Board cannot itself fix one price, nor even a small number of prices for broadly similar products. In other words, the imperfections of the market are not such as can be eliminated by central price-policy—they will persist under any price policy, and could only be removed by a ruthless drive for standardization which might often restrict consumers’ choice to a very unpopular degree.

Given this diversity of demand conditions, far more latitude in the matter of price determination must obviously be left to the individual managers. It is right and natural that the board’s approval should be required for any major price-change, and that it should retain the power both of veto and direction. But it would be absurd for a central body to take on to itself the initiation, in detail, of prices in many different markets from which it is bound to be somewhat detached. Where managers are good, decentralization of decision will lead to a greater flexibility; where managers make mistakes, the board can always use its reserve powers to correct them.

Let us assume, then, that prices are initially fixed by the managers, subject to ratification by the board. On what basis are they to fix these prices? I suggest that the board should instruct them to maximize profits on the basis of the best price they can obtain—should instruct them, in

¹ If the industry should be in process of contraction, or if plants are being closed down as a result of technical reorganization, it will, of course, be perfectly legitimate to continue to operate a plant as long as it can cover its currently disbursed costs. The first case may be treated as one of those permissible exceptions where a subsidy should be paid (see p. 66); in the second case the losses on the overheads should be covered out of rents within the industry.

other words, to equate marginal cost and marginal revenue. Clearly the profits to be maximized must be, in a general sense, long-run profits; managers must be discouraged (in the unlikely event of their needing any such discouragement) from following every temporary change in the market situation, e.g. from raising their prices to the maximum possible level in a period of temporarily inflated demand; it is even more desirable for a public than a private concern to preserve goodwill, and it is to the long-run demand situation that managers must direct their policies. Given that this is understood, there should not (ignoring national considerations external to the industry, which will be considered later) be many occasions for interference by the board in the matter of prices. Two possible causes for intervention come to mind. First, if there were a tendency for price-war to develop. It is just conceivable that some over-zealous manager, taking to heart the injunction to maximize long-run profits, might try to eliminate a rival plant by cutting price below cost, and that a pointless process of competitive price-cutting might ensue. It is not a likely contingency: there would seldom be any incentive to a salaried manager to act in this way, nor under public ownership would he have any freedom to leave his capital charges uncovered. In any case the danger could easily be met by a ruling from the boards that no price was to be cut below full average cost without its express sanction. The second and more likely case would be if profit-maximization led to abnormal profits on a particular line, and if the whole demand could in fact be met at a price which just covered cost without working the existing plant(s) to over-capacity; in these circumstances, where the market could be satisfied without a major act of new investment, the right policy for the board would be to force a price reduction and eliminate the excess profits. Apart from these two cases (and ignoring considerations of national policy) it is not likely that much direct interference with price decisions would be required, and (subject to the above reservations) a healthy degree of competition would be encouraged.

There remains the problem of capacity and the size of the industry. If we could make the Chamberlin 'symmetry' assumption of uniform cost and demand schedules, the answer would be simple. Profit-maximization by each of the plants would give some uniform level of profits. If this was abnormally high, then output would clearly be too low; and if it further appeared that, even were the board to enforce reductions in price, no possible increase in output from existing plants could satisfy demand at a price based on average costs, so that only queues would follow from the falls in price, then in general it would be clear that capacity should be enlarged. Conversely, if there were a uniform negative level of profits, some plants would be closed down: if a uniform normal level, the board would sit back and rest content.

But in practice, of course, the situation will often be highly asymmetrical, and the level of profits anything but uniform, owing to the varying degrees of differentiation between the products and the diversity of cost and demand conditions. The board will then have to fall back on very rough-and-ready criteria. If the combined accounts of the industry as a whole show an abnormal surplus, and if this could not be eliminated by price reductions without the need to ration consumers, then there is a general case for expansion: but the particular direction of expansion will depend on the distribution of these profits between plants and products—the new capacity will be used to reinforce the output of those articles showing the largest profits. Conversely, in the case of the industry as a whole making losses, the least profitable plants would be closed down first. If the combined balance-sheet showed only normal profits, but if this concealed high profits in some sections offset by losses elsewhere, the answer would be found by switching some plants from the production of the less profitable articles to that of the more profitable.

There is bound to be a lack of precision in all this, but the aim is clear: that the board should so manipulate the number of plants, and the products which they manufacture, as to give a situation in which normal profits are being made in every plant and on every article, i.e. each plant should be producing either at the point where its demand curve is tangential to its average-cost curve, or where it intersects it at its minimum, or at some point in between. The general guide to the size of the industry is whether or not a combined balance-sheet shows normal profits; and the distribution of abnormal profits or losses between plants is the guide to which sub-class of product requires more or less capacity for its manufacture.

The actual results will never be perfect, owing to the asymmetrical nature of the problem, but this is surely the sensible ideal to aim at. The industry will stand financially on its own feet. No plant will be failing to cover the cost of its variable factors, and the broad allocation of resources will be correct. Admittedly the output from each plant will be faulty in the eyes of the marginalists, but this is a matter of little importance, and easily outweighed by the advantages of such a solution.

The only question that remains is that of new investment, especially where it involves the construction of entire new plants. A general guide is already provided in the one case by the level of profits in the marginal plant,¹ and in the other case by the level of profits in the industry as a whole. The exact investment rule should then be the common-sense one

¹ The total profits of the industry are affected, of course, by the spread of efficiency from marginal to most efficient units. High profits for the industry combined with only normal profits in the marginal plant would point not to expansion but to the replacement of the marginal by more efficient low-cost units.

that investment should be undertaken when the expected proceeds, on the basis of the price policies discussed, exceed the full expected costs. This rule would apply both to boards and managers, to large-scale and small-scale investment. The whole business of capital expenditure is then brought under some degree of sensible control instead of being a matter of pure speculation, as under the strict marginal rules.

VI

The above conclusions can be quickly summarized. Ignoring the public utility (where it is assumed that either a two-part tariff or average-cost pricing is adopted), there are two cases to be distinguished. (1) Where the physical product is homogeneous the board initially fixes a price to equate current supply and demand, and thereafter expands or contracts the industry until the price which sells current output is equal to the average costs of the marginal plant; the plant managers at all times equate marginal cost to price. (2) Where the physical product is differentiated the plant managers equate long-run marginal revenue and marginal cost (subject to a right of veto by the board), while the board will expand or contract the industry as a whole, and the production of separate articles, until average costs are equal to average revenue both for individual plants and individual products. In addition, (3) in all cases new investment will be undertaken if expected receipts (on the basis of the above price rules) cover full expected costs.

None of these directives is in the slightest degree difficult to comprehend. Managers in both cases will be instructed to make the best profits they can (though the board will occasionally stop them from doing so). The board is concerned in the short run to find the price that clears the market without the need to ration customers, and in the long run to cover the costs of the highest-cost plant in the one case, and in the other to ensure a situation of normal profit in all plants. Thus all the directives can be couched in familiar commercial language, and the executives concerned will not be required to take up the fascinating but time-wasting pastime of puzzling over the curves, the surpluses, and the indifference maps.

VII

It would be merely silly to pretend that this (or any other) set of rules provides all the answers in every case. It does nothing more than provide a general framework within which policy should operate, and all manner of complex problems of interpretation will arise. Nor is it free from difficulty even as a general framework. There are four obvious problems in particular which need to be briefly discussed.

First, these rules beg, and the whole discussion has begged, the question

of the definition of costs and what is meant by normal profits. This would require a separate treatment of a lengthy kind. But I do not in fact feel that this question presents any insoluble difficulties. It is, of course, greatly simplified by the bias which the above rules have in favour of average-cost, and against marginal-cost, pricing—a bias which renders largely irrelevant much of the elaborate debate on short-run and long-run marginal cost, on escapable and inescapable costs, &c. Given the average-cost approach, and given a certain scepticism about exactly determinate ‘ideal’ outputs, it becomes possible to accept, as the total costs to be covered, the actual costs laid on the nationalized industries by recent Acts of Parliament. There is no difficulty of definition here: no problem arises of what constitutes a normal return on share-capital, since both compensation payments and payments on new borrowing will be of a fixed-interest kind. The only doubt will therefore concern what constitutes a ‘normal’ provision for reserve—and this is a matter on which no very precise guidance can be given.

However, to define total costs by reference merely to these legislative provisions may be uncongenial to a great many economists. They would argue, first, that it was quite wrong for all publicly owned industries to be permitted to borrow at a fixed-interest rate, quite irrespective of risk, and that interest rates should be therefore graded according to risk, or that there should be a graded contribution to a central pool of risk-bearing, or even that all nationalized enterprises should be required to borrow from the private capital-market without the support of a Treasury guarantee. But as long as the public sector includes only the type of established industry which it now includes, and does not extend to dog-racing or gold-mining or similarly hazardous trades, this does not seem a very important objection—no considerable maldistribution of resources is likely to result from the fact of fixed-interest borrowing. Again, it is sometimes argued that if full compensation is paid, and if interest on compensation stock is counted as one of the capital charges of the nationalized industry, then, if monopoly profits were being made before, they must continue to be made under public ownership if compensation payments are to be met. But in practice compensation is paid in stock bearing only a gilt-edged rate of interest, so that there is an appreciable reduction in capital charges as compared with the total of interest-plus-dividend payments under private ownership; moreover, all future borrowing will be at a lower rate. On the whole, therefore, the objections to accepting the definition of total costs which is implied in present legislation are not formidable,¹ and it seems

¹ Much the most objectionable provision, which appears in some of the Acts, is one which it is hard to take at its face value—namely that all capital should be redeemed over a period of years. It is doubtful if in practice this will mean very much; net repayments of large

better to do so than to get involved in complicated schemes for a variable 'annual payment' of the sort that have been recently suggested.¹

The second difficulty that presents itself is that of joint products. Where one plant is producing several different varieties there may be many different price combinations which would cover the total of average costs. This is, of course, perfectly true. But in the case of a multi-product plant the board will be interested not merely in the profit of the plant as a whole, but also in the profits or losses incurred on the separate articles, so that it may know which lines to expand and which to contract. This is not, in practice, hard to discover. Detailed systems of standard costing are already the stock-in-trade of all large private concerns and are now being introduced into the socialized industries. It will not be difficult for the board to discover the separate cost of each article, and it then has all the information it needs both for its own future policy and for judging the correctness or otherwise of the actions of the manager concerned.

Thirdly, it may be argued, in the case of the differentiated-product industry, that the instruction to maximize profits is not a clear one in an oligopolistic situation, owing to the indeterminacy which surrounds the demand curve for any one plant. This would be a serious difficulty only on two assumptions: that complete freedom was left to managers in the matter of prices (and selling costs and quality changes), and that the instruction was interpreted in a spirit of very vehement competition. Neither of these assumptions will normally be fulfilled. Managers will be in far less doubt, as compared with an oligopoly situation under private enterprise, as to the likely price-policies of their rivals (or colleagues, whichever they should be called). The Central Board has to sanction all price changes, and it will very soon become pretty clear to managers on what general principles it is acting in this matter; a body of precedents will be built up, from which it will soon be possible to make a fairly safe guess as to what the Board will and will not permit in the matter of price changes. Moreover, it is known from the start that price-cutting below the level of average cost is forbidden as a competitive weapon, and also that prices which give monopoly profits will be forced down either directly or indirectly. Ignorance about reactions on the side of selling-costs will no longer be an important factor, since plant managers are not likely to be left either with much choice or many resources in respect of expenditure on sales-pushing. Altogether, therefore, the area of doubt and uncertainty is enormously narrowed as compared with a normal oligopoly situation. And quite apart from the control exercised by the board, it is not in the

sums is not likely to be practicable, and the process of redemption will be accompanied by an equivalent amount of new borrowing from the Treasury—the whole procedure being an alternative to building up a reserve fund which might encourage awkward demands for wage increases. ¹ A. M. Henderson, *Review of Economic Studies*, 1948-9, vol. xvi (1), No. 39.

nature of salaried managers to indulge in wild bouts of highly competitive activity—they have little incentive to do so; the watchful and mutually suspicious atmosphere of a private competitive oligopoly will not be present, and the indeterminacy will be correspondingly reduced: such competition as exists will be (for better or for worse) of a more gentlemanly and leisured kind. All in all, although the fact of interdependence will make decisions slightly harder and more complex, it is not easy to believe that whatever element of ambiguity remains will seriously impede the managers in the carrying out of their instructions.

Lastly, what is to be done if the board itself abuses its monopoly powers? Individual managers are to be prevented from making persistent monopoly profits by the actions of the board—but suppose the board itself ignores the rules which enjoin on it the aim of normal profits? In the ordinary case, a monopoly price would very soon reveal itself in high profits (or would be concealed by a high level of inefficiency—but this is not a matter which can be cured by any set of price rules). But in the case of an industry faced with a permanent decline in demand it would not be so revealed: the board might be making merely normal profits, and still the price be a monopoly one. Or, for example, the railways might be covering their costs, and appearing to obey the rules, but in fact only doing so by virtue of deliberate restrictions on road haulage. In such cases of declining demand the profit criterion becomes misleading; what is required is a process of contraction, and not the maintenance of a certain level of profit from the existing number of plants. But in practice, with the quantity of detailed information available, such cases of monopoly pricing should not be hard to detect, and once detected they become a matter for a ministerial direction. No single criterion can be expected to be clear in all circumstances, and any general set of rules must be supplemented by *ad hoc* directions when the need arises.

None of these difficulties, then, seem overwhelming, and to set against them there is an impressive list of advantages.

First, these rules, unlike the strict marginal ones, are all simple and easily comprehensible. They do not require of business executives a complete revolution in their mode of thought and operation, but use concepts which are already familiar and propose policies which are in large part already normal commercial practice and so will come naturally to those charged with the management of the nationalized industries.¹ If approved,

¹ Not that price policies, obviously, will always be the same as under private ownership, e.g. they will be markedly different where high monopoly profits were being made before. But they will be more nearly similar than if marginal-cost pricing in its strict form were adopted. This prospect should only be seriously distressing to those economists who apparently believed that the only purpose of nationalization was to achieve the 'ideal' output by the application of the marginal rules. Most of those who support nationalization do so for somewhat different reasons.

they would help to bridge the disastrous gap between current theory and current practice which has opened up as a result of the marginal-cost debate.

Secondly, they retain for public industry the criterion of profit and loss. Besides providing a rough guide to consumer preferences and giving to the required directives a practical clarity which they badly need, this provides one (though by itself an insufficient) incentive to economy and check on efficiency. Many new systems will need to be developed to ensure the lowest possible costs and the highest possible efficiency in the public corporations, but meanwhile it will be a not negligible advantage to have the profit-and-loss account as a partial guide to what goes on.

Thirdly, they avoid the losses inherent in the marginal rules, and the consequent burden on the Exchequer. No problem thus arises of a redistribution of income in favour of particular groups of consumers, nor of a diversion of resources elsewhere as a result of the new taxation.

Fourthly, in regard to 'imperfect competition' industries, these rules do not impose on the government the absolute necessity, if losses are to be avoided, of reducing the number of plants and so the area of consumers' choice. The government may still wish to encourage standardization and may close down plants in the process, but it will have a free choice between lower costs and greater variety, instead of the scales being heavily weighted on one side.

Fifthly, they encourage a certain element of competition between individual plants, which may prove stimulating to initiative and enterprise.

Sixth, they bring investment policy under sensible control and provide for it a common-sense criterion which will prevent those grandiose empire-building schemes that might easily tempt a new board, naturally anxious to impress the public, if no clear profit-and-loss check were provided.

And, lastly, these rules, employing the price-mechanism as a means of meeting the wishes of consumers, give as near an approximation to the 'optimum' allocation of resources as in the real world has any meaning. The broad inter-industrial division of resources will be correct, and it will not be possible for any considerable quantity of transferable factors to be employed in one use when consumers would clearly prefer them employed elsewhere; on the contrary, resources will move freely in response to the changing pattern of consumers' demand. One can ask no more of a set of rules than this.

VIII

So much for the general rules. But there must always be a number of legitimate exceptions in cases where external factors obtrude which are not taken care of by any set of price directives. These exceptions will

relate in particular to the traditional reservations of welfare economics, and to dynamic considerations which confuse and cut across the problem of allocating a given quantity of resources. It will be useful to make a rough list of these permissible exceptions, since one wants the minimum of ambiguity on a subject such as this.

For this purpose I shall ignore the 'non-commercial' type of public service normally financed out of public funds, and also those cases (e.g. civil aviation) where political or strategic factors are held to overlay the question of the right output.

First, in certain cases an industry may be deliberately run at a loss in order to achieve a desired distribution effect. To falsify the system of prices with this object would be entirely legitimate, and on a par with any other form of indirect tax or subsidy. Suppose, for example, that the process of food distribution were taken over by a series of public corporations, as recommended by the Lucas Report, no objection could be raised on welfare-economics grounds if these corporations were run at a loss in order to subsidize food-consumers at the expense of income-tax payers. The same might apply to a nationalized building industry. There could never be more than a few of such cases, since it is only rarely that the consumers of a nationalized product will be a class whose income it is desired to raise at the expense of other classes; and it would in any case be undesirable that this method should be at all widely used, in view of the great practical drawbacks of a large-scale subsidy policy. But in a small number of cases, where the product is mainly consumed by the lower-income groups, this must stand as a possible exception to the rule that total costs should be covered.

Secondly, there is the problem of external economies and diseconomies, and the divergence between private and social cost. There are two spheres in which this divergence is likely to be important. The first is the location of industry, and the second is the closing down of obsolete plants in cases where local unemployment may persist. The latter is likely to be a particularly burning question in both the coal and the steel industries as the process of reorganization develops. Now clearly the solution is not an elaborate structure of bounties and taxes. All one can do is to demand (and if necessary ensure by using the ministerial powers of direction) that social costs are taken fully into account when decisions are made, even if this involves not keeping strictly to the letter of a set of profit-and-loss rules.

Thirdly, an exception may be made in the case of an industry faced with a permanent decline in demand, but possessing a large quantity of fixed equipment which has no alternative use other than as scrap. If it becomes finally clear that such an industry cannot, even over a long period, cover

its full costs, it may be right to relieve it of part or all of those fixed capital charges which relate to non-transferable capital resources. The economic cost of using these resources is zero, and it is clearly better to go on producing with them so long as prime costs can be covered, rather than waste their potential value in production and incur the risks of social dislocation and local unemployment which a sudden contraction might bring with it.

Fourth is a case which has been very topical over the last few years: the combination of very large cost-differences between plants with a demand which outruns current supply even at a price based on the highest-cost unit. Steel and coal have both been instances of this. They have been burdened with high-cost and obsolete production units which they could not scrap because current demand required every ounce of capacity to be kept in production. In both cases new plants (or pits) take many years to construct (or sink), so that no quick alleviation was to be expected. And in both cases the cost-difference between best and worst units was enormous—in coal the spread in 1947 was from 28s. 8d. to 68s. 5d. a ton.

What in these circumstances was the correct price policy? The rules would have suggested a price which equated supply and demand without the need to ration consumers. This would in practice have meant a price exceeding even the costs of the marginal units, and one which gave the intra-marginal units enormous profits. But this would surely have been a pointless policy. The high profits could not have been quickly reduced by the installation of new and more efficient capacity; they were not needed as evidence of insufficient output, since the shortages were spectacular enough in themselves; and the consumer would have been mulcted to no very good purpose and with little prospect of quick relief. Admittedly one solution would have been for the government to allow the high profits, but to take from the industry a large annual payment which could have been used to reduce taxation. But the simpler solution was surely to modify the price rules: to give the consumer the benefit of a lower price and forgo the high profits, and to subsidize the high-cost from the low-cost plants. The only drawback would be the need for a rationing scheme: the advantages a more stable price-level and lower raw material costs. Such a policy of averaging out costs must, of course, be rigorously restricted to very exceptional cases such as coal and steel over the last few years. The rule that the costs of the marginal unit must be covered is the essential safeguard against that most tempting but most damaging policy—of looking only at the industry's overall operations, and allowing the profits of low-cost plants to be swallowed up in financing the losses of obsolete units that ought to be scrapped. If nationalization is to succeed, it certainly cannot afford to be sentimental about old plant.

And, lastly, there are dynamic considerations of full employment,

inflation, &c. These have been touched on in the previous case, and there are, of course, innumerable situations in which they will influence price and output decisions. In a depression it may be desirable to promote capital expenditure in the public sector regardless of profitability, and to keep up current production and so employment even though full costs cannot be covered. Conversely, in an inflation, investment which certainly offers good returns may have to be restrained, and price increases which would be justified by the rules may be refused in the interests of price stability. Possibly, too, a severe balance-of-payments crisis may require that exports be expanded even though production for the home market is more profitable.

Issues of national policy such as these, which are external to the industry, are bound to be primarily the responsibility of the Minister, and not the board, and they will form the subject of ministerial directions. There may, of course, be other exceptional cases in which ministerial intervention will be required—one cannot legislate for every contingency. Nevertheless, each occasion on which the board is asked to depart from its normal price-and-output policy must be justified by reference to considerations such as the above; the general bias must be in favour of a reasonably strict set of rules if the socialized sector is to be under any degree of sensible control.

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NOTE ON THE PRICE POLICY INDICATED BY THE NATIONALIZATION ACTS

By D. N. CHESTER

So much has been written by economists about the theoretical considerations which should govern the price policy to be followed by the managements of the various nationalized industries that it will at least be a change to look at the actual legislation and see what is contemplated in practice.

Each of the Acts usually lays upon the Board which is to manage the particular industry the duty of supplying the commodity or service in a manner variously described as 'efficient', 'economical', 'adequate' (the Transport Act uses all these three), and 'co-ordinated' (or 'properly integrated' for Transport). The National Coal Board, for example, has among its duties 'making supplies of coal available, of such qualities and sizes, in such quantities and at such prices, as may seem to them best calculated to further the public interest in all respects, including the avoidance of any undue or unreasonable preference or advantage'. This is a very large umbrella capable of covering many different schools of thought, for all are concerned with furthering the public interest in all respects, though those who wish to take special advantage of different elasticities of demand may be a little chilled by the last eleven words. There is thus not much guidance here.

During the discussions on the various Bills it emerged that everybody was concerned with securing greater supplies at much lower prices—more and cheaper was clearly the slogan. But there was little or no discussion on what was meant by the various adjectives. In the Committee stage of the Gas Bill Mr. Hugh Gaitskell (Minister of Fuel and Power) had an entertaining exchange with a member of the Opposition on the meaning of efficient and cheap when resisting an amendment to replace the reference to co-ordinated, efficient, and economical gas supplies by the simpler words 'To provide a cheap and abundant supply of gas'. One member pointed out that a Rolls Royce was efficient but not cheap, at which no doubt the Minister remembered his days as a teacher of economics. As for the phrase 'furthering the public interest' Mr. Shinwell (on the Coal Bill) was good enough to say 'It means exactly what it says', but went on to explain for the benefit of lesser minds: 'Furthering the public interest depends on the circumstances. It may be appropriate, in certain circumstances, in order to further the public interest, not to export coal, but to utilize coal in such a fashion as will enable us to export other commodities. On the other hand, there may be such a super-abundance of coal in given

circumstances as would enable us to supply, more than adequately, the needs of coal consumers overseas.¹

In the same discussion Mr. Shinwell made the important statement that 'everybody here with the most elementary knowledge of economics knows that one is bound to relate price levels to the cost of production'.² But he was tantalizing enough not to say what he meant by 'cost of production'. The Acts, however, appear to lean heavily in favour of the supporters of average costs. The government's general policy is to be found in section 36 (1) of the Electricity Act, 1947, the important words being: 'It shall be the duty of the [British Electricity Authority] so to exercise and perform their functions . . . as to secure that the combined revenues . . . are not less than sufficient to meet their combined outgoings properly chargeable to revenue account taking one year with another.' Other Acts vary the wording somewhat. For example, though it is now usual to use the phrase 'taking one year with another' the Coal Act uses the phrase 'on an average of good and bad years'. But the general purpose is always the same: the boards need not cover³ their outgoings on revenue account every year but they must do so over some not very well-defined period.⁴

The first important point to notice is that the wording applies to the whole of each board's affairs, whether viewed geographically or functionally. In the first instance, with the same kind of economic interests, e.g. producing coal, the board may make a loss year after year in some areas providing it covers its total outgoings over a period. There is nothing in this section which would prevent the National Coal Board running the South Wales coalfield permanently at a loss providing other coalfields offset this loss in the national accounts.⁵ A similar policy could be followed by the boards operating electricity and transport and by the proposed Iron and Steel Board. In the case of iron and steel it is proposed that though most of the existing companies should continue under their own name, as publicly owned companies, the individual concerns will be under no statutory obligation to cover their total costs so long as the Iron and Steel Corporation balances its accounts over all its companies, 'taking one year with another'. The only exception is found in the Gas Act, for here each of the twelve Area Gas Boards are treated as separate financial and management entities and the general rule applied to each of these boards. The Regional Coal Boards are, of course, purely administrative and not

¹ Standing Committee C, 12 Feb. 1946, col. 1004.

² Col. 1028.

The rule is that revenue shall not be *less* than (not merely equal to) outgoings, i.e. continuous profits are legal but not continuous losses.

⁴ The Coal Act contains the limiting phrase 'consistently with the proper discharge of their duties under sub-section (1)', i.e. of making supplies of coal available, &c., and of securing the efficient development of the industry.

⁵ It may be argued that such action would be incompatible with the board's statutory duty of 'securing the efficient development of the coal-mining industry'.

statutory bodies, and though the Area Electricity Boards are statutory they have little or no measure of financial independence and the rule in this case is applied to the total accounts of the British Electricity Authority.

In the second instance the general law implies that where a board supplies several kinds of product the rule about covering outgoings applies to the total of these products and not to each form of product.¹ Thus the National Coal Board besides the production and sale of coal also produces and sells bricks, coke, motor benzol, and certain other products. There is nothing in the Act to prevent the board selling all or any of such products below their average cost providing the loss can be made up on coal sales or on other activities. A more significant example is transport. Here, though each of the main forms of transport (including hotels) are managed by different executives appointed by the Minister (and not by the board), the rule about revenue being not less than outgoings applies to the total of all the executives' accounts and not to the accounts of each executive. Thus, providing the British Transport Commission could recoup its losses from the operations of one or both of the two Road Executives, there is nothing to prevent the Railway Executive following a price policy which led to its accounts showing a large loss. Again, whereas previously the London Passenger Transport Board had to cover its own costs the executive which replaced it has no such statutory obligation. It is the total financial effect, not the effect of any particular activity of the Transport Commission, which is governed by the rule.

I am here concerned only with the words of the various Acts. How the boards will act within the limits of their discretion is a different question. It should be noticed that the accounts which have to be published by the various boards must show the financial results of the different activities. The normal rule here is again to be found in the Coal Industry Nationalization Act. The Accounts of the National Coal Board 'shall conform with the best commercial standards and . . . shall distinguish the colliery activities and each of the main ancilliary activities of the Board'. In the case of electricity the accounts of the central authority and of each area board must be shown separate and separate information must be given for generation, distribution, and for each of any other main activities, e.g. selling appliances. For iron and steel it is proposed that the publicly owned companies should continue to be subject to the provisions of the Company Acts as regards accounts and that in addition the proposed corporation (or holding company) should publish a statement of accounts of each company.

The Minister of Transport (Mr. Barnes) drew a distinction between the keeping of separate accounts and the separation of the individual activities

¹ The Gas Act, 1948, is a partial exception in that the manufacture of plant and gas or coke fittings (taken together) are treated separately from the other activities of the board.

for purposes of financial and price policy. He said: 'This Bill (i.e. the Transport Bill) is to integrate all forms of inland transport in this country, and if we were to proceed on the physical breakup of each section . . . we should defeat the aim in view. If (the) whole case rests upon the need for publication of the accounts so that public opinion can see . . . the contribution to the general pool which each section has to make, that is another matter . . . (which) will undoubtedly be met.'¹ A minute or two later he went on to say 'the whole purpose of this Bill is . . . to unify the services, so that the average cost of transport will be economic and will be efficient', but I do not hazard an opinion as to what is implied by this statement. The fact that the accounts of the various activities must be shown separately is bound to encourage boards to treat such activities separately for the purpose of the receipts-outgoings rule. There are other interesting aspects of the rule that revenue must not be less than outgoings taking the board's activities as a whole. For one thing, the range of activities covered by the rule in each case is partly a matter of chance, partly a matter of choice. Because some colliery companies owned brickworks and coke ovens the National Coal Board can merge the costs of these with the costs of producing coal. Had the government decided to have a National Fuel and Power Board and had treated the coal, gas, and electricity in the same way as the Minister of Transport has treated railways, road transport, and canals (i.e. as executives subordinated to the one board), the rule would have enabled the board to offset losses on one kind of fuel by gains on another. I am not arguing that one or other system is right, but only pointing out that the application of the rule to the 'firm' and not to the 'product' has certain possibly accidental consequences. Incidentally, on the different treatment of fuel and transport some words of the Minister of Fuel and Power (Mr. Hugh Gaitskell) have a special interest. On the Second Reading of the Gas Bill he said:

'It is not our view—let me make it perfectly plain—that we should dictate to consumers what fuel they should use. To do this and to ignore consumers' preferences would not in our view give the best results, and freedom for consumers to choose is something which, as a long-term proposition, I regard as an essential part of civilized society. . . . Nor should we overlook the value of retaining competition between electricity and gas. It has been a stimulant in the past and it can bring benefits to the community in the future, provided it is subject to certain safeguards; but this does not mean that there should be no co-ordination whatever in this field . . . while the consumers should be free their choice should be influenced by reference to costs . . . charges for different fuels should reflect the true cost of production and distribution to the community. . . . The principle must be that charges can and should correspond to real costs.'²

A different question may arise where the board has a complete mono-

¹ Standing Committee B, 19 Feb. 1947, col. 1441/2.

² *H.C. Deb.*, 10 Feb. 1948, vol. 447, cols. 237-8.

poly for one part of its activities but is in competition with either private firms or with another nationalized board for the other part. The fear that a board might subsidize its competitive activity at the expense of its monopoly activity was expressed several times by the Opposition during the discussion of the various Bills. Mostly it tended to get mixed up with a rather different but still substantial fear that a board might give preferential terms to a government department or to the board of another nationalized industry at the expense of its private customers.¹ For that reason words are usually included by which a board is usually required to avoid undue or unreasonable preference (the wording varies from Act to Act). But undue preference has never been an easy phrase to interpret and in any case it has no application to one activity being subsidized by another.

The point about discrimination came up very prominently in the discussions on the Iron and Steel Bill and these are worth reading. During its passage through the Commons various amendments were made to meet the Opposition's fears on this point.² These rather vague words 'to satisfy the public interest' were changed to 'to satisfy the reasonable demands of the persons who use these products for manufacturing purposes and to further the public interest in all respects'. Also a new sub-clause was added preventing unfair or undue discrimination, 'but without prejudice to such variations in the terms and conditions on which those products are supplied as may arise from ordinary commercial consideration or from the public interest'.

Further amendments were made to this clause in the House of Lords, of which one was rejected by the Commons. The Lords cut out the last five words in the sub-clause just quoted. The Commons gave as their reason for disagreeing with the Lords on this point 'the words to be left out are necessary to furtherance of the export trade and to give a margin of discretion in meeting the demands of the home market'.

Two other points need touching upon briefly—the meaning of 'outgoings' and of 'taking one year with another'. In some of the Acts the items chargeable to revenue are specifically prescribed. Thus section 93 of the Transport Act, 1947, reads: 'The Commission shall charge to revenue in every year all charges which are proper to be made to revenue, including in particular proper allocations to general reserve, proper provision for depreciation or renewal of assets and proper provision for redemption of capital. . . .' Similar obligations are placed on the boards' management in the coal, gas, and electricity industries. Only the Iron and Steel Bill makes

¹ Cf. Mr. Shinwell's reply to this. 'There is no reason at all why a National Coal Board should discriminate unfairly in favour of one customer against another', but then he went on to say that discrimination might be required in favour of the export trade. Standing Committee C, 13 Feb. 1946, col. 1068.

² See *H.C. Deb.*, 27 Apr. 1949, vol. 464, cols. 187–234.

no reference to the redemption of capital. In other words, the boards mentioned are required to charge prices which will enable them not only to cover ordinary operating costs, depreciation, and interest on capital but also actually to pay off part of their capital each year.

There is little or no guide to the meaning of 'taking one year with another'. None of the Acts contains any interpretation of the phrase. The general impression gained from reading the discussions, however, is that some comparatively short period is intended and indeed the main stress is on the accounts being balanced annually. Mr. Hugh Gaitskill, who, as might be expected, is usually clearer and more explicit on many of these points than some of his fellow Ministers, in dealing with the particular point said:

'We say that over a period of years the accounts must balance. . . . There may be circumstances which may involve them for a time in loss. . . . Private companies make losses and recoup them later. There might even be occasions when the Government might feel, if there was a heavy slump and a lot of unemployment, that it might be desirable on the whole not to insist on costs being covered. I agree that may be a rather remote contingency, but it is the kind of thing referred to in the Coalition White Paper on Employment Policy, and we have, therefore, provided for it here. I would emphasize that I attach a great deal of importance to the principle that normally we should expect area boards to cover their costs each year.'¹

¹ Standing Committee D, 29 April 1948, col. 1145.

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THE COMMERCIAL CRISIS OF 1847¹

By C. N. WARD-PERKINS

I. Introduction

MACPHERSON prefaces his discussion of the crisis of 1793 with the remark that 'sometimes Truth cannot tread very closely upon the heels of Time'. The contemporaries of the crisis of 1847 felt no such caution in delivering their verdicts on the responsibility for the events that finally led up to that prolonged commercial and financial crisis. Subsequently historians have tended too readily to accept these views without making sufficient allowance for the prejudices which sprang from the sharp political, economic, and theoretical cleavages of the time. For this reason alone the crisis is worthy of re-examination with these particular questions in mind. Had Peel's Act of 1844 imposed too rigid a limitation on the note-issuing powers of the Bank of England? Had the latter acted irresponsibly in reducing bank rate to competitive levels, thereby giving its blessing to an orgy of rash and reckless speculation? Did the heavy programme of railway construction so distort the financial structure of the country that it could no longer serve the needs of commerce efficiently? But beyond these issues there lies the problem of fitting this crisis into the pattern of trade fluctuations that are now held to have operated in the British economy since the latter half of the eighteenth century, or even earlier. Here the evidence is scantier, but it is clear that the period does provide some interesting material for the study of the earlier trade cycles.

II. Historical Narrative

The 'Hungry Forties' is one of those unfortunate phrases that has passed into popular economic and social history all too uncritically. Quite apart from the Irish catastrophe, there is little doubt that the standard of living rose appreciably in Great Britain during the fifth decade of the nineteenth century. It had, however, started badly: cyclical movements of prices and production are confused in the late 1830's, but there is clear evidence of the falling off of business activity after 1839, and by the winter

¹ SOURCES: *Report of Secret Committee of House of Commons on the Commercial Distress* (1848), referred to as SC 1847-8; *Report of Secret Committee of House of Lords on the Commercial Distress* (1848), referred to as SC (Lords) 1847-8; D. Morier Evans, *The Commercial Crisis of 1847 and 1848* (1849); W. T. C. King, *History of the London Discount Market* (1936); Sir John Clapham, *The Bank of England*, vol. ii; E. V. Morgan, 'Railway Investment, Bank of England Policy and Interest Rates 1844-8', *E. J. Hist.* 1940; T. Tooke, *A History of Prices*, vols. iv, v (all references are to the original edition); W. Hoffman, *Wachstum und Wachstumsformen der englischen Industriewirtschaft von 1700 bis zur Gegenwart* (Kiel, 1940); E. Halevy, *The Age of Peel and Cobden* (Eng. trans. 1947); W. Schlote, *Entwicklung und Strukturwandlungen des englischen Aussenhandels von 1700 bis zur Gegenwart* (Kiel, 1938).

of 1841-2 the country was in the trough of depression (see Charts Nos. 1 and 2, p. 92).

In 1841 a change of government took place which presaged improvement. Following a general election, Sir Robert Peel returned to power; whatever the political considerations involved, it was certain that the administration would now be carried on in a more efficient manner than under the Whig Ministry of Lord Melbourne, and in 1842 there were stirrings which indicated that a revival of activity might be expected. Earlier in that year rates of interest were reduced; in February the Bank of England was offering advances at 4 per cent. and by April extending that rate to discounts, but as usual the initial stages of recovery were long drawn out.

By 1844, however, recovery was well under way and was associated with the second phase of general railway construction, that of amalgamation and consolidation of the main trunk system. This revival is clearly shown in the revival of import and export, and of production figures, while the downward trend of commodity prices was steadied. Credit was made even cheaper and was easy to obtain. Market discount rates were below 2 per cent., and in 1844 3 per cent. Consols climbed to par.

In this year a seal was set, or so it was hoped, on this revival by the passing of the Bank Charter Act, whose purpose was to prevent the recurrence of financial crisis and commercial depression which had been so disagreeable a feature of British economic history for the preceding half-century. The Act was undoubtedly modelled closely on the principles expressed by S. J. Loyd and the Currency school of monetary theorists, but was associated publicly with the name of the Prime Minister. The avowed aim of the Act was to separate the functions of the Bank into two watertight compartments, an Issue Department, strictly controlled by Statute and 'the operation of natural forces', and a Banking Department in which the Bank could and should operate independently, with apparently little regard to those principles of bank-rate policy that had been laid down by Horsley Palmer in the 1830's.

The history of the next few years is to some extent that of the Bank's attempt to reconcile its split personality. The day after the Act became law, on 5 September 1844, the Directors, taking Sir Robert's advice to heart, announced a new rate and policy for discounting, a minimum rate of $2\frac{1}{2}$ per cent. being accepted for first-class three-month bills. This was competition indeed; market rate, though it had stood below 2 per cent., was tending to rise, and for the next three years minimum bank rate was consistently lower than market rate (see Chart No. 4, p. 94).

There is little doubt that this new active and expansionist line ensured that the era of cheap money was extended, and this developed in 1845 into an orgy of speculative activity that surpassed the excesses of 1824-5, with

a concentration on railway ventures of all kinds, including a considerable volume of foreign railway investments, most of them launched with extravagant claims of the potentiality of the new form of transport as a means of developing commerce and industry. The share values of established companies rose speculatively, while the scrip of projected concerns, on which only 5 per cent. deposits had usually been paid, changed hands at exaggerated premiums (see Chart No. 3, p. 93).

However, it is necessary to draw a careful distinction between the purely speculative and the genuine, if grossly optimistic, aspects of the railway mania of 1845. The fever engendered by the former did indeed affect the latter and more basically healthy elements, for bull operations in scrip pushed up the value of shares. These inflated values enticed railway directors to pursue the policy of maintaining high dividends at all costs.

By July 1845 the force of the boom was slackening and warning voices began to be heard above the clamour. Quite apart from criticizing the absurdity of many of the schemes, they urged the financial impossibility of finding all the necessary capital for the genuine projects and the undesirability of locking up so much of the national capital in railway construction. Before any Bill could be even considered by Parliament, it was necessary to deposit 10 per cent. of the capital that was being authorized with the Bank of England. This represented in the autumn of 1845 over £40 million, if all the schemes were to go forward. In anticipation, money rates began to harden in October, and this was enough to prick the bubble. In point of fact, over 600 proposals never offered themselves for parliamentary inspection, and the deposits required, some £12 million in all, were made in January and February 1846 without causing undue financial inconvenience.

By this time the general outlook was more sombre and public opinion more realistic. Under the shadow of the Irish potato famine Peel's proposal for the repeal of the Corn Laws was presented to the country in February. The money market was faced with the prospect of the heavy importation of additional foodstuffs with attendant drain of bullion reserves. Furthermore, the 1845-6 American cotton crop was short, being only nine-tenths of the average of the previous three crops, and at this time we drew 80 per cent. of our supplies from the southern States. Production was only maintained by drawing heavily on stocks accumulated at the mills and the ports.

On 26 June Peel was defeated in the Commons over the Irish Criminal Bill and resigned. He was followed by a Whig Liberal Government led by Lord John Russell. A poor western European harvest in 1846 promised further anxieties; as for the railways, they were experiencing more and more difficulty in obtaining capital to complete construction, and

shareholders were finding calls more and more difficult to meet. The American cotton crop was even shorter, while imports to Britain were only 60 per cent. of the 1845 level. Stocks could no longer be drawn on as they were in 1846. The price of American cotton moved sharply upwards (Uplands $4\frac{1}{2}d.$ per lb. in 1845 rose to $6\frac{1}{2}d.$ per lb. in 1847), while re-exports abroad were much higher. All this reacted unfavourably on home consumption, which was only 75 per cent. of the 1845 figure. There was inevitably heavy unemployment and short-time working in Lancashire.

Between 23 January and 17 April 1847 the bullion reserves in the Issue Department fell from £13.4 million to £9.3 million, and despite a double rise in bank rate the drain continued. On 15 April the Bank introduced a severe rationing of the bills it would accept. This appeared to check the loss, though the Bank's drastic action met with much complaint in financial and commercial circles.

Meanwhile wheat prices were soaring to levels unknown since 1817, and in May they touched 112s. per quarter. But it was soon clear that the dealers had grossly underestimated the elasticity of supply, while to add to their discomfiture harvest prospects for 1847 were good. After the peak, prices came tumbling down, and in August the failure of corn dealers in both London and Liverpool started. These in their turn involved other houses, who had extended them credit, and like a house of cards, the overstrained credit structure collapsed. The pressure towards liquidity became more intense; bills even of a first-class nature became increasingly difficult to cash.

As the crisis developed, the Bank manfully attempted to fulfil the role of lender in the last resort, and week by week the reserve in the Banking Department dwindled. The real panic came when it was obvious that this reserve was becoming exhausted, and that under the provisions of the Bank Charter Act the Bank would have to refuse further advances and discounts. Everyone, including the soundest houses, scrambled for liquidity and assets other than bank notes were almost unmarketable; the heaviest rates gave no incentive to lenders.

On 25 October 1847 the Bank published a letter from the Treasury signed by Sir Charles Wood, the Chancellor, and Lord John Russell, authorizing the extension of loans provided the rate charged was not less than 8 per cent., and indemnifying the Bank against any breach of the 1844 Act that this policy might involve. The effect was magical: once the possibility of gaining credit was restored, many people found that they were now overliquid (to the extent of £4-5 million, Samuel Gurney hazarded), and in fact the Bank was not obliged to contravene the Act. The next few months entailed some painful readjustments and saw the revelation of some horrifying details, but the national crisis was over, and

by January 1848 Bank reserves were up to £11 million, while bullion reserves were £13 million. The Bank and the country were prepared to weather the vicissitudes of the Year of Revolutions.

III. The Verdict of Contemporaries

It was inevitable that these events should have exercised a powerful impression on contemporaries, and there was a natural demand for inquest. Criticism was centred on the 1844 Act, for at its inception hopes had been fostered that 'it will effectually prevent the recurrence of those cycles of commercial excitement and depression that our ill regulated currency has been the primary cause of' (Col. Torrens). Within three years the country had been shaken by a series of financial convulsions. Thus the 'currency principles', the 1844 Act embodying those principles, Peel as the author of the 1844 Act, and the management of the Bank, were all in the dock. Arrayed against them was a hotchpotch of interests: the 'Banking School' theorists, in uneasy and often disclaimed alliance with those of the heretical Birmingham school; the Protectionists eager to seize any opportunity to discomfit their former leader; various financial and commercial interests anxious to find a scapegoat for the recent disasters and congenitally given to fastening the blame for each and every event on Threadneedle Street.

The majority of the House of Commons Committee acquitted both the Bank and the Act: blame for the crisis was laid primarily on the deficient harvests as being responsible for derangement of the balance of payments, while other causes suggested by witnesses, which the Committee 'accepted as being operative to a lesser degree and with varying effects in different districts', were listed, as the deficient supply of cotton, the diversion of capital to railways, undue extensions of credit, especially in the East India trade, and exaggerated expectations of trade in certain quarters. A colourless proviso was added recognizing the Bank's peculiar relations to the government and its need to consider public as well as private interests. Otherwise no modification of the Act was recommended. It is in fact a singularly uncritical and unilluminating report that is quite unworthy of the great talents represented on the Committee or the wealth of evidence laid before it. However, little but a 'whitewashing' document could be expected from a committee that in all parliamentary history can scarcely be rivalled for the sharpness of the cleavage, or the evenness of the contending sides.

The Report of the Lords Committee is a much more impressive and satisfying document. It is more critical and closer to the terms of reference. It gives a clear statement of the rival orthodox banking theories.

Three recommendations of the report may be separately considered.

First, the distinction between external and internal drains of currency

was stressed, and the need for a different central banking policy to be adopted in either case. Second, recommendations were made regarding the emendation of the 1844 Act to include a discretionary clause to give statutory authority to effect what had been done arbitrarily under the Treasury letter. A discretionary power vested in three ministers had been incorporated in the original draft proposals of Governor Cotton in 1844, but had been omitted by Peel. Opinion was divided whether the discretionary power should be vested in the Ministry, the Bank, or a mixed committee of both. Third, there was criticism of the government of the Bank, which bore immediate fruit in the decision to abolish the rotative principle in the election of a Governor. The Bank's awareness of its responsibilities, however much it might deny them in public, was undoubtedly sharpened by this and other critical advice.

However, if the parliamentary reports tend to give a confused picture of contemporary analysis of the crisis and its causes, the balance may be redressed by considering in greater detail the antipathetic views of two men whose minds were very much made up on the subject, namely, Samuel Jones Loyd and Thomas Tooke.

Loyd's defence of the currency principle and of the Act of 1844, as given before the Committee, was masterly and almost convincing. It was of necessity a defence because something had gone seriously wrong. The fault lay, he maintained, in the conduct of the Bank in the first three months of 1847, when they took 'a course contrary to all sound principles of banking by increasing securities out of banking reserves, these reserves being then taken to the Issue Department and there exchanged for gold'. Further, it had failed to raise the rate of interest 'in a manner sufficient to protect its banking reserve', bank rate being well below market rate in this period. He emphasized that management of the circulation and management of the banking business must be clearly distinguished. Before 1844 the Bank was in a position to mismanage both; now the provisions of the Act placed it out of its power to mismanage the circulation, and had in fact forced the Bank to modify its disastrous policy with an ultimate reserve of £8 million instead of the £2 million to which it had been reduced in 1839; therefore the Act had prevented the occurrence of a convulsion still more abrupt and still more severe, which might have threatened the convertibility of currency itself.

Nevertheless, despite these criticisms, he would not advocate any changes in the government of the Bank, which had now gained valuable experience. He disliked the new competitive policy, which was, he thought, a tendency in the wrong direction, and he deplored the growing reliance on the Bank as a leader in the last resort—'an unfortunate feeling on the part of the public that they are entitled to look to the Bank for

all the support they require, an expectation which it is impossible for the Bank to satisfy' (QQ 5191). The peculiar position of the Bank must necessarily make it more responsible than other financial institutions (QQ 5192).

There is, however, a curious divergence between Loyd's exposition and the popular views of what the currency principles, as embodied in the Act of 1844, entailed, and it was these views that Thomas Tooke assailed. 'It was the favorite boast of the advocates of the measure that its immediate result would be to deprive the Bank at once of the power and the responsibility of regulating the currency' (vol. iv, p. 62), and speaking of the new discount policy, 'the directors now conceived that their only duty was to make as much as they could of the capital at their command'. In Tooke's opinion the 1844 Act was by itself an inadequate weapon of currency and credit control, while it encouraged vain hopes in the public and bred irresponsibility among the directors; in particular the Bank now tended to grant credit with too great ease in good times, and to restrict it too violently in times of stringency. This policy entailed frequent changes of bank rates, which in itself bred uncertainty and speculation. Further, its provisions forced the bank to apply clumsy and inopportune remedies that were not necessarily requisite to the situations involved; in particular it forced the Bank to apply a credit stringency even when the Exchanges were favourable, when in fact what was wanted was a conditional and judicious support of the market.

Tooke's strong case was weakened, however, by his refusal to face up to the excessive degree of speculation which was to remain a feature of the London money market until the crash of Overend and Gurney in 1866.

Despite the criticism and heart-searching, the Act remained unamended, to weather two further crises in 1857 and 1866 and to continue in force until World War I, as an 'institution' whose limitations were circumvented by a combination of good fortune and good management.

IV

(a) The Effect of the Food Shortages

It would be profitable to examine in closer detail the results of the unusually high food imports and how these linked with the commercial collapses; then to analyse the nature of the restricted raw cotton imports, and finally to consider what the exact part the heavy railway construction of the period played.

Various estimates of the amount of additional foodstuffs which were necessary to feed the starving Irish or to cover the deficiencies of the harvests of 1845 and 1846 have been made. Scholte estimates a rise of £11 million in unfavourable balance from 1845 to 1847, while Tables I

and II show clearly how the barrel was scraped to get these supplies, and how much of the additional grain came from the United States. Some of

TABLE I

Wheat and Flour Imports stated in Thousand Quarters of Wheat, 1845-8

	1845	1846	1847	1848
Russia . . .	330	204	850	523
U.S.A. . . .	93	808	1,834	296
B.N.A. . . .	229	327	328	183
Total all sources .	1,140	3,300	4,400	3,000

(Source: *Pp. Eng.* 1850, vol. li, p. 307.)

TABLE II

Principal Grain Imports other than Wheat, 1845-8, expressed in Thousands of Quarters and Thousands of Hundredweights

	Units	1845	1846	1847	1848
Barley . . .	Qtr.	370	370	770	1,050
Oats	Qtr.	590	790	1,705	970
Maize* . . .	Qtr.	60	705	3,600	1,500
Maize meal . .	Cwt.	..	130	1,450	230
Rye meal . . .	Cwt.	..	..	790	35

* About 50 per cent. of the maize (Indian corn) came from the United States.
(Source: *Pp. Eng.* 1849, vol. i, pp. 418-25.)

the strain on the balance of payments was eased through the lower volume of raw material imports, notably cotton and wool (though at considerably higher prices).¹ That the bulk of these payments were made to the United States was the opinion of contemporaries, and this is borne out in the figures for United States balance of payments and bullion movements for

TABLE III

United States: Balance of Payments and Bullion Movements, 1845-8

	Balance of trade (\$ mn.)		Bullion movements (\$ mn.)	
	In	Out	In	Out
1845	7.1	..	..	4.5
1846	8.3	..	..	0.1
1847 . . . .	..	34.3	22.2	..
1848	10.4	..	..	9.5

(Source: Smith and Cole, *Fluctuations in American Business 1790-1860*.)

the period. The free-trade argument that additional imports create a corresponding demand for exports was confirmed in the way that the

¹ For textile raw materials there were £9 million less imports in 1847 than in 1845, if official values are taken. The actual value of imports must, however, have been considerably higher.

United States imports rose in 1848, but the immediate effect could only be an adverse balance on current account that had to be met either by movements of bullion from the country or of foreign capital into this country. By a deliberate act of policy, the Russian Government took the latter course (Tooke, bk. iv, pp. 73-4).

But if the food imports were the primary cause of bullion drain during the early part of 1847, causing the Bank to tighten its discount policy, ironically enough it was the unexpected response of supplies to higher prices that burst the speculative boom in wheat and touched off the explosive chain of bankruptcies and failures. The corn speculators deserve some sympathy; they considered they were performing a public service in buying forward heavily in all markets, and the spectacular rise in prices was world-wide. In Odessa, New York, and Philadelphia all the main grain market quotations in early 1847 were double the average for 1846.

(b) Over-trading

But the shaking of credit due to these failures and the consequent drive towards liquidity revealed an even less satisfactory state in affairs in other produce markets, especially those associated with colonial goods. As one witness put it, 'There has no doubt been a vast deal of over-trading' (C. Turner, before the Commons Committee), and many of the evils proved to be of a long-standing nature.

What does the term 'over-trading' signify? It is one of the convenient omnibus words that may cover anything from downright sharp practice to genuine commercial misjudgement which is inevitable if the entrepreneur is to fulfil the function of risk-bearing. At this time every variety of over-trading was facilitated, even encouraged, by the great advances that had been made in the ease and cost of obtaining credit. The London Bill of Exchange had developed over the half-century with the growth of the London Discount Market, while the growth of joint-stock banks, eager to employ deposits, increased the volume of discounts and acceptances.

Over-trading thus might consist of embarking commercial transactions of a speculative nature, encouraged by the ease of obtaining credit. This often involved borrowing short and lending long, and renewing short credit from time to time with accommodation bills; or again a bona fide mercantile transaction might be used to pyramid credit; as Sir Charles Wood put it: 'The East India Trade appeared to be carried on less with a view to profit or loss, than as a mode of raising money by the creation of bills.' Thus the real asset that was theoretically the collateral for the money given for the bill might be supporting bills of three or four times the value. Finally, there was the device of raising credit by fictitious transactions and the maintenance of this position by the drawing of further accommodation,

the parties concerned having mutually agreed that the bills would not be presented for payment. This clearly amounted to misrepresentation and was a fraud carried out on those who accepted the bills in good faith; however, the financial institutions had laid themselves open to these abuses—the joint-stock banks by accepting bills without proper security, and the discount houses taking over bills (of which in many cases they must have known the true nature) simply because they were guaranteed by the joint-stock bank's signature.

Even when a failure or stoppage took place, the distinction should be clearly made between (1) temporary inability to meet liabilities owing to illiquidity; (2) failure to cover liabilities due to depreciation of assets realized hurriedly at knock-down prices; (3) genuine commercial losses; (4) situations where real assets even valued at normal prices could not cover liabilities. Naturally each of these distinctions merges into its neighbour, yet the relative degree in which it occurs is important, for the first measure is largely only the extent of unsound financial practices, the second is often the result of pure hard luck, the third is surely an inevitable feature of an aggressive expanding economy, while it is the fourth that fundamentally represents unhealthy financial development.

(c) The Role of the Cotton Shortage

It has been shown that the short supplies of retained imports forthcoming in 1845 and 1846 inevitably led to a drop in production once stocks had been reduced to a working minimum. This alone is sufficient reason for the distress in Lancashire, and is borne out by the fact that immediately supplies were easier in 1848 production leaped ahead. This is confirmed by the fact that manufacturers and spinners were then finding the restrictions of the 1847 Act irksome, and were circumventing it by the relay system.

Thus, though a sharp depression in cotton textiles was contemporaneous with the financial crisis, there appears to be no obvious connecting link; this unlucky coincidence accentuated the difficulties of Lancashire and Glasgow's manufacturers, merchants, and bankers, which is shown by the many failures in these areas.¹

(d) Railway Investment

Also coincident with the financial disturbances was an incredibly heavy programme of capital investment in the form of railways. Almost all contemporary authorities were agreed that this development had played a large part in promoting the crisis and rendering it more intractable.

¹ Failures, August 1847–July 1848: London, 108; Liverpool, 54; Manchester, 30; Glasgow, 35; rest of England, 25. (Source: M. Evans, *op. cit.*)

Undoubtedly this attitude is in part explicable in the light of the general opprobrium attaching to railways which was growing in strength in 1848 and culminated in the crash of the Hudson empire in the spring of the next year.

The view expressed was that railway construction had put an undue strain on the national economy, principally through the conversion of floating into fixed capital. This may be called the Floating Capital Fund Theory and is admirably stated in this extract from a circular of Collman & Stotterfeht, Liverpool merchants, issued in 1846: 'It is utterly impossible that so rapid a conversion of floating into fixed capital, and a diversion of such immense sums from the industrial pursuits of the country should not deprive them of their very life blood.' There is no solid evidence that other industries were starved of working capital, while as to the assertion that money invested in railways passed out of circulation (or, as Spooner sarcastically put it in questioning a witness, 'was buried in between the tracks'), is the exact reverse of the truth, for railway investment must have had a stimulating effect on the economy. This was clearly realized by the Birmingham school: 'through the railways 200,000-300,000 were employed who might have otherwise been in the workhouse'.¹

The bubble element, which culminated in the crash in October 1845, makes sorry reading. It transferred money into the hands of some unscrupulous racketeers, but what were the long-run consequences? The Victorians were not deterred from speculative investment, which continued at fluctuating rates till 1914, but the bitter experience gained meant that the general public was never again so completely gulled as it had been in 1845. As for genuine railway investment, its results were even more positive. By 1850, 4,500 miles had been added to the British railway system with advantages to our economy, reaped in the succeeding decades, which were incalculable. And what can be placed on the debit side?

(1) In real terms, did over-investment lead to an inflationary pressure on prices, and was there a condition of over-employment? The price rises of 1847 might suggest this, but their collapse after October indicates that they were in fact speculative, though based on a genuine expectation of short supply.

(2) Were other industries starved of capital resources? The textile industries were already working below capacity after a burst of investment in the period 1844 to early 1846. The investment necessary to affect the volume of savings at full employment had in the 1820's and 1830's largely taken the form of foreign loans; there is no evidence that opportunities for

¹ Muntz, evidence before Commons Committee. He was later to become an M.P. for Birmingham.

such investment existed in the 1840's or would have been taken up if they had offered themselves. In fact foreign investment was not resumed on a large scale till it was itself associated with railways. During the late 1840's railway construction was the factor that blunted the force of the depression which developed early in 1846 and, despite the financial uncertainties of 1847, maintained the level of employment and income.

The stimulus given to subsidiary and cognate industries, such as iron and steel production, mechanical engineering, coal, and shipping must also be reckoned into account. It is clearly traceable in production series, such as those developed by Hoffman. By the time the initial primary demand of the home railways had slackened, the gap was filled by overseas railways financed by British capital. The effect of this was, firstly, to reduce the reliance on textiles in our export trade by adding substantial quantities of iron and steel, machinery and coal; and, secondly, to produce a more healthy form of foreign investment with money and real capital marching hand in hand to the more solid benefit of lender and receiver alike. It is certain that the harvest of cheap food and raw materials that Britain enjoyed from 1880 onwards was the result of an investment policy in 1850-70 which had during that time maintained effective demand at a high level.

There was some strain undoubtedly on the credit structure of the country. Investment in railways decreased the liquidity of many persons and institutions; especially was this the case after October 1845, when the continued depreciation of share values must have made holders reluctant to convert them into cash. Second, the meetings of railway calls must have embarrassed many individuals, involving sums of £100 million and over in the years 1846-8. This could not be paid out of current savings and involved drawing on past accumulations. One consequence was the fall of bank deposits, particularly those of county banks, estimated by S. J. Loyd at 20 per cent.,¹ but in so far as the railway calls were spent, this was in the nature of a transfer payment. Further, the critics cannot have it both ways; if the easy money policy of 1844-6 caused the over-speculation, the demands of the railways tapped off some of the excess and put it to productive uses. It may be hazarded that the main financial result of the railway investment was to divert savings from the local county banks to national institutions and this was a further cause of the former's diminishing importance. How far did investment in foreign projects impose a strain on our balance of payments? Actual calls in 1847 involved £5.7 million (according to Morier Evans), and much of this must have been balanced by specific exports and direct payments to British engineers,

¹ Higher figures were given by other bankers; for example, Hodgson gave the figures of 25-33 per cent. before the Commons Committee.

contractors, and workmen, and some of it must have returned to this country. The net figure cannot have been serious.

The general conclusion can only be that railways were 'more sinned against than sinning', that the maintenance of the ambitious railway programme, despite the financial uncertainties of 1847 and 1848, was both immediately and ultimately beneficial and had the rare merit of being a contracyclical investment that was in itself productive. It is unfortunate that the intellectual dogmatism of the time made it impossible that the money voted for Irish relief should be spent equally productively.

These more detailed studies of individual features may be summed up as follows: the shortage of raw cotton was the primary cause of short-time working and limited production in Lancashire and Glasgow, while that of foodstuffs resulted in a large but temporary outflow of bullion that caused the Bank of England to improve some stringency on the money market. Both shortages led to speculative activity that proved ill judged in the event, and the resulting failures were too much for a credit system that had suffered too many shocks of recent months and was fundamentally in none too healthy a condition. Railway construction, however, cannot be fitted into the picture except as a stabilizing factor.

V. Conclusions

How do these conclusions appear if reviewed in the light of production and price movements during the period?

(a) Production Trends

Here series as given by Hoffman have been developed (see Chart No. 2). Examination of these reveals several interesting features:

1. The General Index shows maxima for the years 1836, 1839, 1845, 1848, 1853, and 1857, and minima for the years 1837, 1842, 1847, 1851, and 1855. However, the percentage deviations are much greater in the earlier years, while the minimum for 1847 has certain unusual features.

2. In the decade 1840-9 the series for Consumer Goods industries and Producer Goods industries show some interesting differences, the former preceding the latter by about two years. This does not appear to be the case in the next decade. Particularly after 1845 has this the effect of smoothing out the combined fluctuations from trend, even if we accept the 1847 figure which for CG industries series is accentuated by the external factor of the raw cotton shortage. The incipient depression of 1854-5, however, is averted by the combined rise of both types of industry, due possibly to the demand created by the Crimean War.

3. This difference between the two series may be explained either by the leadership of the textile industries (the CG index is over 50 per cent. weighted

with textiles) or the lag of the PG industries in this period due to the completion of railway projects in 1840-1 and 1847-8. This feature does not recur in the 1850's, which suggests that it is the lag of the latter rather than the leadership of the former that was the operative factor in the 1840's.

4. It is clear that the impact of the financial crisis of 1847 does not make itself apparent in production trends. This is shown by the recovery of 1848, while the low figures of 1847 were due to the abnormally low cotton production of that year.

5. In the period 1834-48 PG industries appear to have more violent fluctuations—mainly due to the bursts of railway investment. This does not appear to be the case for the period after 1848. None of these series show the violent fluctuations of the Shannon Brick index when deviations of 30 per cent. above and below trend are recorded. This index is probably over-sensitive because of the large number of producers and the ease with which production can be stepped up and contracted. However, its general movement shows reasonable agreement with Hoffman's PG index.

6. Serious depression in 1847, according to the Hoffman series, was confined to textiles, but here, as I have shown, the falling off of production was probably due to the bottle-neck of raw material supplies (though more evidence regarding wool conditions is required). The boom cotton production of 1845 can be partially explained by over-assessment of the new China market and cotton exports recovered remarkably well after 1847.

7. The stress laid (in the Commons Committee's hearings) on the general and serious nature of industrial depression can be explained largely by the desire of the Protectionists and the Birmingham school to make the most of the crisis. 'Birmingham was seriously depressed, profit margins were negligible, German competition in hardware was a grave menace', so ran the evidence of P. H. Muntz. He was insistent that all would be well if, not only the 1844 Act, but also that of 1819, were repealed. Yet strangely enough, there were no bankruptcies in the Birmingham district. Among industrialists failures were almost entirely confined to Manchester and Glasgow; however, it was the Manchester Chamber of Commerce who rebuffed Birmingham, when the latter urged a common approval to the government, with the retort that they were not satisfied 'that banking policy had been by any means the chief cause of the recent commercial dislocation, and they would still less sympathize with those who would advocate loose, unsound, impracticable changes on the basis of our currency'.¹

(b) Price Movements

Are price movements in the period significant? Chart No. 3 shows the movement of the commodity price indices prepared by Silberling and

¹ Quoted Redford, *Manchester Merchants*, p. 185.

Jevons, neither of which is altogether satisfactory since our period lies at the end of both series and they are scarcely representative. The hardening of prices after 1843 probably reflects both the effect of easy money rates and of industrial recovery; prices, however, continued to rise through the early part of 1847. This may be explained by the maintenance of cheap money combined with bull speculations in certain commodities; there is a general sagging of prices with the tightening of money rates and the collapse and liquidation of the speculative activities. Here it should be remembered that Silberling's index is strongly representative of those colonial goods that played the major part in the speculation and liquidation, while Jevons's index is weighted more heavily with cereals. There is need for an index that shows more adequately the fluctuations of prices of the raw materials and semi-manufactured products of industry.

The cheap money policy of the Bank until the spring of 1847 was clearly salutary and, after the scares of 1847, interest rates were soon again at a low level; at the same time the continued railway construction was playing, however unconsciously, the part of a public works programme employing in 1848-9, Tooke estimated directly and indirectly, upward of 300,000 workmen or 10 per cent. of the industrial labour force. Thus a depression was avoided which, had it been as severe as that of 1840-3, would have shaken the social and political structure of the country.

That the national income cannot have fallen unduly in 1847-8 is apparent from the evidence afforded by such items as the volume of food imports, the tonnage of sea-coal entering the Port of London, and the home consumption of such semi-luxuries as tea, sugar, and coffee.

It is clear that the importance of the financial crisis was exaggerated by the interested parties. The situation was not worse than 1825, as more than one witness before the Commons Committee stated, for then a financial crisis had been followed by a sharp fall in production and full recovery did not take place till the mid-1830's. Over-much attention was focused on the Act of 1844 and on the Bank's policy in carrying out the Act. Partially this arose from the exaggerated hopes that had been entertained of the Act, and one sure casualty of the crisis was the belief that the Act itself provided an automatic regulation of the credit of structure. The Bank, too, received far severer criticism than it merited and chiefly from those with whom the real fault lay. Contemporary banking theory was ever seeking to reconcile these conflicting standpoints: one, that the authorities should regulate the credit mechanism, and, two, that in accordance with tenets of *laissez-faire* and unfettered competition, individuals should be uncontrolled. As Peel bitterly put it, 'If that is the practice of your commerce, don't complain of the Act of 1844. What security can I give you to a Bank that has £600,000 of paid up capital and lends £500,000 to one house?'

The Bill of Exchange, an ingenious and beautiful credit instrument, and the new forms of finance and banking were in their way as momentous as Watt's steam-engine, yet both were peculiarly liable to clumsy and criminal mishandling. It would take two more crises before the London Money Market learnt its lesson in this respect or the Bank had gained the necessary experience and authority to control the situation. Yet in each case the wounds inflicted on the credit structure healed with remarkable rapidity and from no conscious adoption of any one policy. As is usual, the theorists overestimated the importance of policy. Recovery took place, more as the result of the inherent vitality of an expanding economy than as the achievement of logical and consistent policy. Indeed, so swift and sure was the progress that it is difficult to recapture the emotions of those thoughtful and balanced individuals who felt that England's commercial fate had trembled on the edge of an abyss in those dark days of October 1847.

PEMBROKE COLLEGE,
OXFORD.

APPENDIX

The Beveridge Index

I find it impossible to accept this as satisfactorily representing production movements for the period 1835-50 because the series used for railway construction cannot be accepted. That chosen is for mileage authorized 'as construction followed rapidly on authorization'. This is not borne out by the evidence produced by J. Wilson in *The Economist* of 3 October 1845 or by Tooke or Morgan, whose evidence makes it clear that there were lags of up to four years between the authorization and completion. A much more satisfactory series could have been constructed from mileage completed or capital actually raised or a combination of both.

Beveridge acknowledges the inadequacy of this series and assigns it the equally unreal weight of one; this is a clear case of two wrongs not making a right. Railway construction in this period was a major industry not to be ranked with hemp. However, the only workable general series is that which does not include railway construction at all, though this is playing *Hamlet* without the Prince of Denmark with a vengeance! After 1844 this series consists of twelve individual series, five of them textiles with a combined weight of 33, and the remainder with a weight of 55. Iron and steel and engineering are not represented, while coal is covered by clearances from the Tyne and Wear—in the 1840's ports on these rivers were facing increasing competition from Stockton and Hartlepool. Both these criticisms are met in the corrected series given in *Oxford Economic Papers* No. 4, but, unfortunately, no new general index without railways is given. Textiles are thus unduly represented, and in view of short-term bottle-necks in supplies, textile production figures can furnish us with little more than general trends, except in those periods when supplies are known to be freely available. The Brick series, prepared by Shannon, is heavily weighted and is surely too sensitive for the purpose, for deviations from trend up to 30 per cent. cannot have been paralleled even in the building industry as a whole.

Cotton and wool have over 50 per cent. of the weightage of the Consumer Goods series and it is fluctuation in these two industries which largely determines the fluctuations from trend of that index. At all periods those two industries were particularly liable to bursts of over-production, usually associated with the opening up of new markets and with bottle-necks, especially in the supply of raw material.

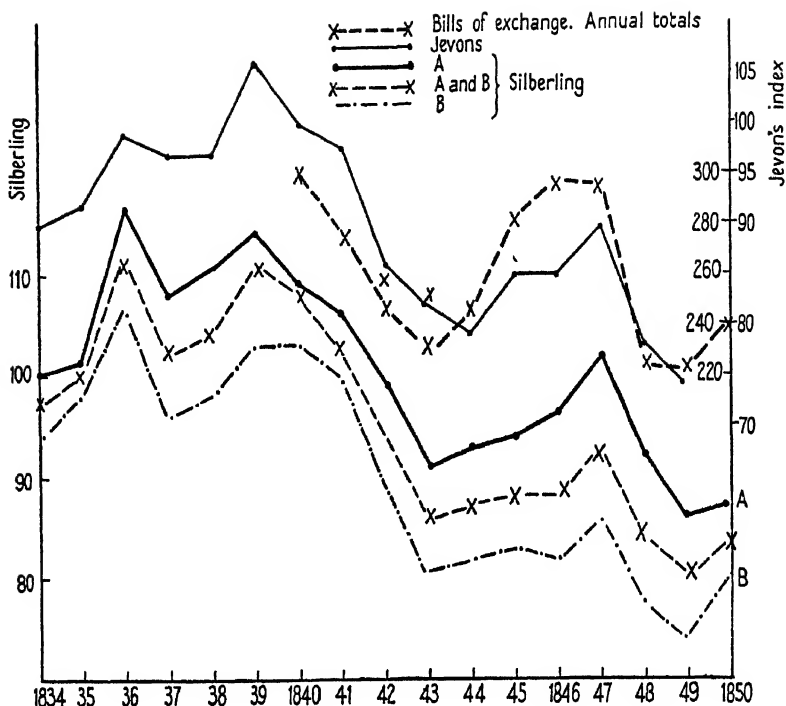


CHART No. 1. *Prices and Bills of Exchange, 1834-50.* This shows the movements of the Jevons and Silberling Price Indices, and a Volume Index of Bills of Exchange prepared from figures given by Tooke (bk. vi, p. 591). There is no significant difference between Jevons's and Silberling's results, and the turning-points of the Bill Exchanges appear to fit in with these price indices. This result might be expected from the nature of the series used in each case. The fall of the bills in 1847 as compared with 1841 is due to the abnormally low volume in the last quarter of that year.

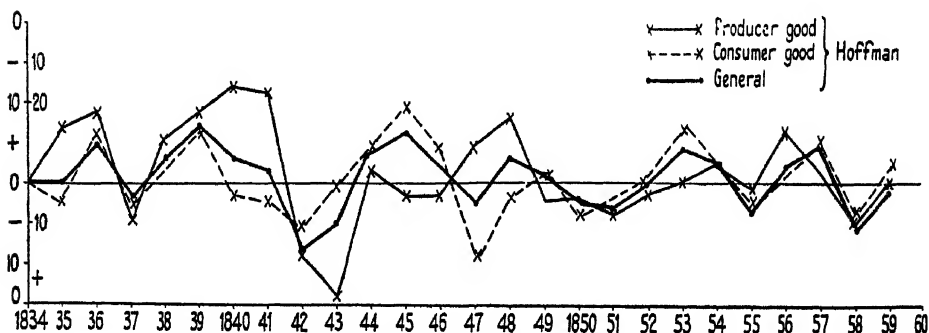


CHART No. 2 represents the percentage variations from a fitted trend of the indices prepared by Hoffman for Consumer Goods and Producer Goods industries and for his General Index. The chart is described in the text of the article.

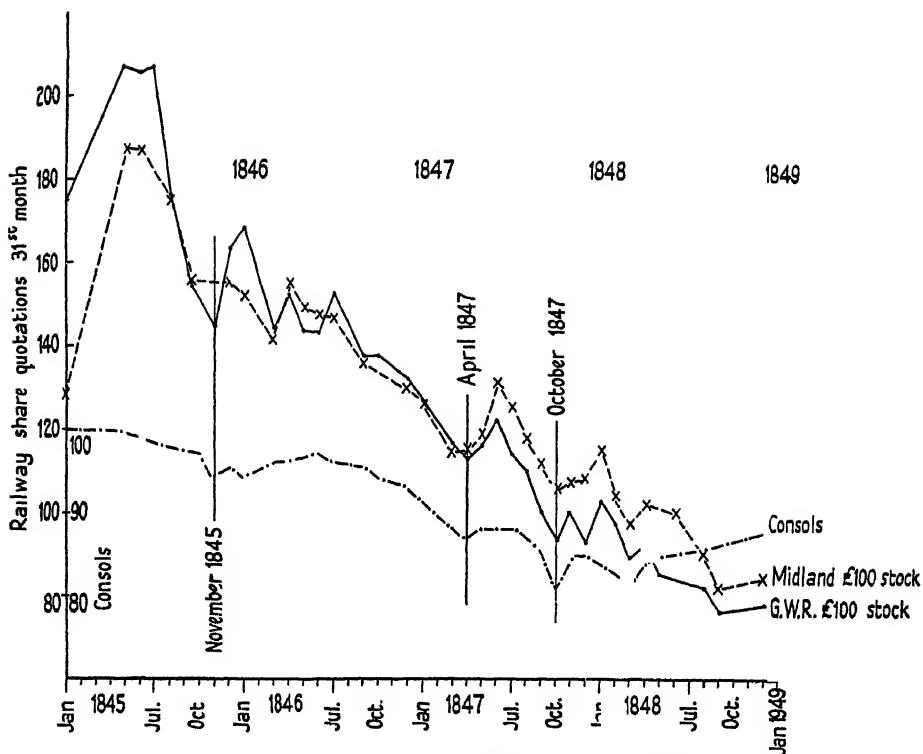


CHART No. 3 shows the movement of certain railway share prices and 3 per cent. Consols between Jan. 1845 and Jan. 1849. These features should be noted: (1) The spectacular boom and crash of 1845, with its 40 per cent. rise and fall of share values. (2) After a slight recovery, from Dec. 1845, there was a continuing downward trend, which represented both the volume of selling and the realization that high dividend rates could not be maintained. Consols share in this downward trend till Jan. 1848. (3) Superimposed on the long-term trend were a number of short-period fluctuations which correspond exactly with the periods of stringency in the money market, namely, Feb. 1846 and April and Oct. 1847. Consols, too, show the same fluctuations, though to a less marked degree.

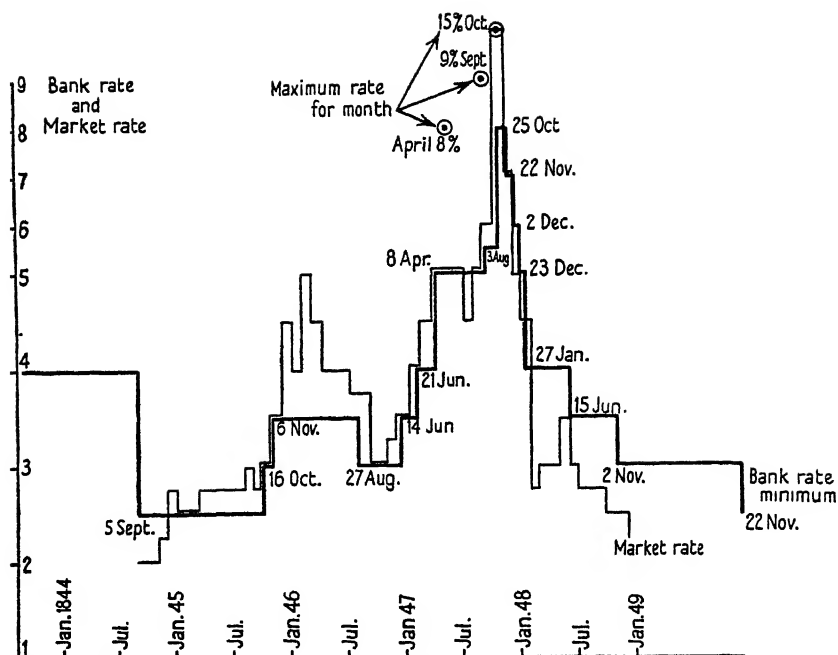


CHART No. 4 shows the relation between bank rate and the market rate on first-class bills for the period Sept. 1844–Jan. 1849 (the latter figures are obtained from Tooke, bk. vi). The extent to which bank rate was consistently below market rate before Oct. 1847 is clearly indicated. After Oct. 1847 the reverse is true. In certain months, notably April, Sept., Oct. 1847, market rate varied between wide limits.

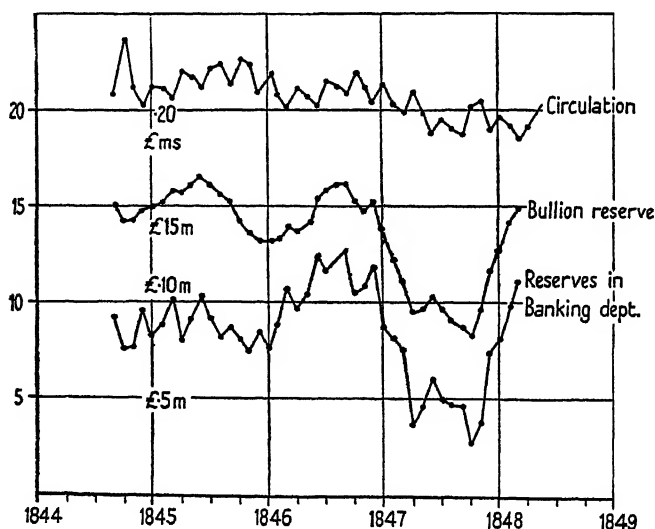


CHART No. 5 shows the fluctuation of total circulation, bullion resources, and reserves in the Banking Department of the Bank of England. Fluctuation in total circulation reflects quarterly dividend payments and is remarkably steady after the initial expansion of Oct. 1847. Bullion resources and reserve in the Banking Department tend to move together. This suggests that internal gold movements are relatively unimportant.

BUFFER STOCKS AND ECONOMIC STABILITY¹

By R. S. PORTER

THE storage of crops in times of plenty for use in times of scarcity has long been recognized as desirable. The Chinese are said to have operated an 'Ever Normal Granary' system many hundreds of years before the birth of Christ. The famous Biblical story of Joseph and the granaries of Egypt illustrates, however, one of the difficulties which confront all those who would undertake such desirable activity, the difficulty of foreseeing the future. Writers on this subject have often mentioned with approval the fact that Joseph supervised the storing of grain, but they do not mention the most instructive and the most interesting part of the story, which is that the storage operations were undertaken as a result of Joseph's interpretation of Pharaoh's dream which foretold seven years of plenty to be followed by seven years of famine. Thus Joseph had, in effect, fourteen years of perfect knowledge of the future, as far as this problem was concerned. Unfortunately, merchants to-day are not gifted with this remarkable power of prophecy and so the storage of raw commodities involves great risks to the person storing them.

Prices in Primary Markets

The organized commodity markets have succeeded in devising a mechanism whereby the risks attaching to the holding of commodities are transferred to those who wish to bear them. This is achieved by the operations of the futures markets which facilitate the storage of commodities from the time of harvest to the time when they are consumed within the crop year, so that seasonal fluctuations of prices are considerably reduced. But the futures markets do not operate so satisfactorily when it is necessary to store the surplus crop of one year into the future. Storage from one year to another is both risky and costly, and the risks increase in proportion to the amount which has to be stored. Thus in time of surplus the price must fall very low indeed before people are willing to undertake the risks involved in holding the commodity. The risks being great there must be a proportionately high reward to attract the necessary amount of risk bearing. But the reward can only take the form of a margin between the present price and the price at the future date which will be large enough to cover the storage costs and the risk premia of the speculators.

Even if the supply was responsive to price changes and it took a com-

¹ I should like to acknowledge the encouragement, advice, and criticism of Mr. A. Loveday, Warden of Nuffield College, in the course of my research, some of the conclusions of which are summarized in this paper.

paratively short while for equilibrium between demand and supply to be restored, the oscillations of prices would be considerable. But in fact, in the case of agricultural products, supply is very unresponsive to price changes, particularly with respect to downward movements. The restoration of equilibrium between demand and supply including the surplus stocks tends therefore to take very much longer, and the oscillations of prices tend to be very much wider than in the case of manufactured goods where it is much easier to adjust supply to short-run changes of demand.¹

It should further be noted that the willingness of speculators to assume these risks varies with the general state of business activity and confidence. Thus, during the upswing of the trade cycle it is plausible to assume that stocks would be financed with a lower risk premium than during the downswing. This would mean that a given surplus would tend to cause a greater fall in prices after the peak of the cycle than before it.

Depression of business is almost always associated with very low prices for primary products, even of those whose demand is inelastic with respect to incomes as well as prices, the normal demand for which would not be expected to fall to any great extent. Part of the fall in prices is naturally the result of the curtailment of the demand for those products which are used directly in industry, the effect of which would tend to spread to other agricultural products, but it is a plausible hypothesis that part of the fall is accounted for by a shift of speculators' demand curves which makes them less willing to undertake the financing of any surplus stocks which may exist. Thus the violence of the fluctuations of prices which have been characteristic of primary commodities since the turn of the century is the result, firstly, of the inelasticity of demand for those commodities, secondly, of the inelasticity of supply in the short run which leads to the piling up of stocks when demand slackens, and, thirdly, of the high risk premia required by speculators to induce them to store any surplus which may appear.

The consequences of the violence of the fluctuations of primary commodity prices are too well known to require detailed analysis. Particular emphasis must, however, be placed upon the disastrous effects which those fluctuations have upon international trade.

In times of depression the primary producers find their earnings of foreign exchange sharply reduced, their balance of payments become adverse, and the exchanges are dislocated. Their demand for the manufactured products of the industrial nations is consequently reduced, and so those countries while enjoying the advantage of very favourable terms

¹ Cf. Lord Keynes, *Treatise on Money*, vol. ii, bk. vi, chap. 29, and an article in the *Economic Journal*, 1938, entitled, 'The Policy of Government Storage of Foodstuffs and Raw Materials'.

of trade suffer the disadvantage of unemployment in their export industries. This may accentuate any deflationary tendencies present in their economies. It is not possible to redeploy the working population to take advantage of the windfall provided by the change in the terms of trade since resources used in the export industries can only be transferred to home production with great difficulty, and the problem of transferring them back when demand revives is equally intractable.

The type of full employment policy which is generally recommended, for example, in the White Paper on Full Employment Policy, or in Lord Beveridge's 'Full Employment in a Free Society', seeks to counteract a fall in employment by increased government expenditure both on investment and on consumption. By maintaining the level of business activity in industrial countries such a policy, if pursued simultaneously by all such countries, would tend to check the drastic fall in primary producers' incomes which in its turn affects the size of the export market for manufactured goods. To be successful such a policy requires the complete co-operation of the United States, since American demand has in the past dominated the markets for primary raw materials and will no doubt continue to do so.¹ The effectiveness of internal measures to maintain full employment in the U.S.A. in maintaining the supply of dollars to primary producing countries depends upon the timing of the government intervention, and there are great practical difficulties to be overcome. It is probable, therefore, that, even if all countries including the United States were prepared to co-operate in a policy of full employment, there would still be a time-lag between the onset of depression and the commencement of government intervention. This would be sufficient to set in motion a cumulative process of contraction which would increase the amount of government expenditure required to restore the system to a higher level of employment. Thus, if some method of maintaining the foreign-exchange earnings of primary producers at the onset of trade depressions could be found, it might be possible to check the cumulative process of deflation in the international economy and thus facilitate the maintenance of full employment in the industrial countries by the use of internal measures.

The Use of Buffer Stocks

We have argued that part of the violence of the fluctuations of primary commodity prices can be accounted for by the risks involved in storing any temporary surplus which may appear. This is particularly the case

¹ U.S. Dept. of Commerce, *The United States in the World Economy*, p. 29: 'Computations by the United States Dept. of Agriculture based on data for 1927 and 1928 show that this country's share (U.S.A.'s share) in the consumption of nine principal raw materials and foodstuffs was 39% of the total for the 15 most important nations.' The commodities used in the compilation are cotton, wheat, sugar, rubber, silk, copper, tin, tea, and coffee.

if the surplus is due to a temporary decline in the demand for industrial raw materials. These risks could be removed to a very large extent by the institution of an International Buffer Stock Agency. The discussions of commercial policy which took place in the immediate post-war years were much concerned with the wide fluctuations of primary commodity prices, and the League of Nations in its publication entitled *International Stability in the Post War World* gave a clear account of the idea.¹

The Agency would establish a buying and selling price for each of the commodities with which it dealt. It would be prepared to buy any amount of the commodities offered to it at its buying price, and would be prepared to sell any quantities at its selling price. The price could not fall below the Agency's buying price so long as it had finance and storage facilities, and it could not rise above the selling price so long as the Agency had any stocks at all.

The reduction of the uncertainty concerning the future course of prices of those commodities dealt with by the Agency would reduce the risks attaching to the holding of stocks by merchants and speculators, so that they would be willing to hold larger stocks at higher current prices. Thus it is extremely unlikely that the Agency would itself have to store the whole of the surplus; it would only have to take that part of it which was not taken by the market at its buying price. The proportion of any surplus which the Agency would have to store would depend, amongst other things, upon the expectations of future price movements made by dealers and speculators, compared with the buying and selling prices of the Agency, the financial strength of the speculators, and the size of the surplus.

The first point is of considerable importance. If the dealers expect the price to rise in the future, but to a level which is lower than the Agency's selling price, they will be unwilling to allow too great a proportion of stocks to go to the Agency since they will incur unnecessary expenditure in recovering them. Thus so long as the price which is expected to rule at some future date is below the Agency's selling price, and yet sufficient to cover costs of storage to that date, it will pay speculators to hold stocks themselves rather than allow them to pass into the hands of the buffer stock Agency. If, on the other hand, the price is expected to rise to the Agency's selling price it will pay speculators to allow stocks to be held by the Agency, and ordinary merchants will obtain their requirements from the Agency when supplies are short.

The possibility of variations in the Agency's buying and selling prices must be allowed for and, in so far as these are capricious and unpredictable,

¹ A concise discussion of the purposes and general principles for the operation of international buffer stocks for primary raw materials also appears in Mr. R. F. Harrod's *Dynamic Economics*, p. 123 et seq.

confidence will be reduced and the Agency will have to hold a greater proportion of any surplus stocks which exist. It follows, therefore, that the price policy should be as predictable as possible in order to avoid the waste of the Agency's resources as a result of unnecessary uncertainty in the market.

Provided the Agency has sufficient funds it should always be possible to put a floor under the price of any storable commodity. But the considerations mentioned above lead to the conclusion that the amount of storage necessary to achieve this result will vary considerably from time to time and from place to place, and much will depend upon the ability of the Agency to inspire confidence. The greater the apparent strength, the less often will it be required to use it. The case is similar to the operation of the gold standard by the Bank of England in the latter part of the nineteenth century. Simply because the world had confidence in its strength and integrity it could operate with a relatively small gold reserve.

So far we have considered only the beneficial results which could come from providing a floor to possible price falls.¹ The provision of a ceiling is, however, equally important. In the later stages of a boom there is a tendency for raw material prices to rise sharply; this tends to lead to investment in primary production which may be both excessive and difficult to undo. This is particularly the case with plantation crops where a long period of time must elapse before any investment commences to yield additional supplies, and in which over-investment may have very disastrous results. Moreover, it may often be the case that the rise in the prices of raw materials tends to increase the general inflationary movement at the height of the boom, thus helping to precipitate the crisis. Moreover, there appears to be a tendency on the part of manufacturers to hoard raw materials in times of rising prices, buying in excess of their normal requirements and thus accentuating the rise in prices. Though it is dangerous to suggest too simple an explanation of the upper turning-point of the cycle, yet it does seem plausible to suppose that shortages of raw materials are an important factor in many cases. In so far as this is true the Agency, by postponing the appearance of those shortages, may postpone the operation of one of the possible causes of collapse.²

The beneficial results to be achieved by the successful operation of buffer stocks are therefore twofold. By preventing primary commodity

¹ Cf. R. F. Harrod, *op. cit.*, p. 125.

² An alternative approach to the theoretical justification of buffer stocks is obtained by following the reasoning of Professor Sir Hubert Henderson in his article on the Price System in the *Economic Journal*, December 1948. Buffer stocks can be regarded as a rational method of preventing the wide divergences between the long-term equilibrium price and the short-term equilibrium price which Sir Hubert regards as providing adequate reason for a certain degree of interference by the State with the price system.

prices from falling to excessively low levels during depressions the deflationary spiral in international trade is to some extent avoided, and by preventing the violent upward movement of prices during booms the appearance of an unstable situation on those grounds should be at least postponed.¹

Proposals in favour of buffer stocks were made by the British delegation to the Hot Springs Conference on Food and Agriculture in 1943, and they have since been on the Agenda of the Food and Agricultural Organization. Little came of the original proposals at Hot Springs since the conference was divided on the issue of whether buffer stocks by themselves could secure adequate stability of incomes for primary producers. It appeared that the majority of producers themselves were in favour of the quantitative regulation of production. The discussion at Hot Springs has not so far stimulated much consideration of the real problems involved in successfully operating buffer stock schemes. It might indeed be argued that in any case the idea is of academic interest only, since it presupposes the existence of world markets for the commodities concerned which can only exist under a multilateral system of trading. Those who believe that the maladjustments in the world economy are such that more liberal commercial arrangements can never be restored, at least for many years to come, will naturally regard institutions designed to facilitate the working of a multilateral system of trading as irrelevant to the important issues of our time. But in so far as this country is committed to support the International Monetary Fund and the International Trade Organization it is perhaps permissible to suppose that policy should be directed towards the creation of conditions in which those institutions may operate. Buffer stocks are a method of decreasing the instability of a multilateral trading system, and they deserve to be considered in that light. A later section of the paper will deal with the difficulties which reduce their usefulness in a world which is faced with a serious shortage of dollars and the consequent bilateral agreements and exchange control.

Assuming the existence of world markets for the commodities traded by the Agency there are four main groups of problems:

1. Those problems associated with the formulation of the principles involved in a rational pricing policy.
2. Problems concerning the administrative and financial arrangements.
3. Problems raised by government subsidies and other forms of assistance to particular national groups of producers.
4. Technical problems arising out of the fact that primary commodities

¹ An analysis of the trade cycle which stresses the importance of changes in prices of primary commodities and stocks is given by Mr. P. W. S. Andrews in his book, *Manufacturing Business*, chapter vii.

are not homogeneous, but consist of a large variety of grades and qualities related to one another by price differentials.

In this paper attention will be confined to the first two groups of problems, since if these are solved the others can be overcome more easily. The latter group in particular are of a technical nature which are capable of solution in principle but a consideration of which would unnecessarily complicate the argument. The discussion relates to agricultural commodities. A similar approach is possible with minerals, but it must be modified to take account of the greater elasticity of supply in the short run.¹

Price Policy

The problem of determining the principles governing the pricing policy of a buffer stock Agency is a twofold one. First, there is the determination of the initial buying and selling prices of the Agency, and the principles upon which they should be changed. Secondly, there is the problem of determining the correct margin between the buying and selling prices.

The first problem can be expressed diagrammatically. In Fig. 1 let DD be the market demand curve for any commodity dealt with by the Agency, let OB be the Agency's buying price, and let OS be the Agency's selling price. Suppose that the total supply during any period for which DD applies is OC . In the absence of any intervention by the buffer stock agency the price would therefore have been OP . But the Agency is prepared to buy unlimited quantities at the price OB . At this price the market is prepared to take OE of the commodity, and so the Agency must store EC .

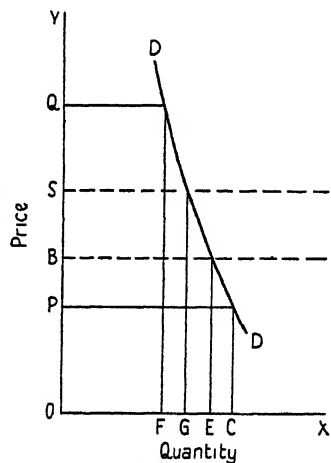


FIG. 1

Now let us assume that the supply is OF .

In the absence of intervention by the Agency the price would have been OQ , but the Agency is willing to sell unlimited quantities at the price OS . Since the amount the market is willing to take at the price OS is OG , the amount that the Agency will have to supply will be FG .

If the amount represented by EC is persistently greater than the amount represented by FG , the Agency will accumulate larger and larger stocks until it exhausts its funds or its storage space and the scheme collapses. If, on the other hand, FG is persistently greater than EC , the Agency will lose control of the market, for it will be unable to supply large enough quantities to prevent the price from rising above OS .

¹ It is hoped to discuss these and other problems at some length in a later publication.

It can be seen from the diagram that, given demand conditions, lowering the buying and selling prices will tend to diminish EC and increase FG , and raising the buying and selling prices will tend to increase EC and diminish FG . Thus, given the demand curve and a fluctuating supply, it would be possible in principle to arrive at a position where the amount stored just balanced the amount sold over a reasonably long period. If bumper harvests were more frequent than short ones the price would need to be lower than if bumper crops and short crops followed in regular succession. Similarly, if bumper crops occurred less frequently than short crops the prices would need to be higher than if they occurred in equal numbers.

In principle, therefore, it would be possible to obtain the right levels of buying and selling prices, provided the harvest variations were reasonably regular. Allowance would, of course, have to be made for such unexpected occurrences as the appearance of the bumper coffee crop in Brazil in 1928-9 only two years after a record crop, which contributed to the collapse of the Coffee Defence Institute.

But the assumptions so far made of a fluctuating supply confronted with an unchanging demand curve are unrealistic, since both supply and demand fluctuate in practice. With some commodities such as coffee, fluctuations on the supply side are far more important than those on the demand side, while fluctuations of demand are the more important in the case of industrial raw materials. For a commodity such as wheat the price fluctuations are the result of fluctuations both on the supply side and on the demand side. But though it is not realistic to work on the basis of the same demand curve at the time when the Agency is buying as at the time when it is selling, nevertheless, the fundamental principle remains that buying and selling prices should be so adjusted that the Agency neither loses nor gains stocks, over a period covered, for example, by one complete trade cycle.

This suggests that it would be possible to regulate the buying and selling prices of the Agency with reference to the rate of accumulation of stocks or the volume of sales. Thus, if the Agency discovered that it was accumulating more stocks than it could reasonably expect to dispose of, it should lower its prices, while if it found that its stocks were being reduced to dangerously low levels it should raise its prices.

The disadvantages of this system lie in the difficulty of knowing what level of stocks is excessive. The Agency cannot in any case make a decision until a complete cycle has taken place, since it has no means of knowing during the slump how much it will be required to sell during the boom to prevent the price from rising above its selling price. But once surplus stocks have been accumulated the damage will have been done, since

lower prices than normal would have to be maintained in order to dispose of them, thus causing unnecessary hardship to producers. In fact, it might be argued that truly surplus stocks should be disposed of through channels quite apart from the market, in order to avoid the unsettling effects of such stocks both upon the markets and upon the producers. What is clear, however, is that if the Agency tried to govern its pricing policy by the volume of stocks it held, the price changes would be infrequent and probably quite violent, and this might disturb the markets to such an extent that confidence was destroyed and the Agency involved in much storage which could be avoided if a more predictable policy was followed.

For this reason a system whereby the Agency's buying and selling prices moved downwards automatically when it had been buying for a certain length of time, and moved upwards automatically when it was selling for a certain length of time, would be much more satisfactory, if it could be made predictable, since it would tend to forestall the accumulation of excessive stocks or the exhaustion of the stock piles.

This could be achieved by fixing the buying and selling prices for a given period, say one crop year, a given percentage below and a given percentage above the average of the prices which ruled in the market during a preceding period. If during any one year the price was at the Agency's buying price, the average would tend to be lowered so that in the following year both buying and selling prices would be reduced. Alternatively, if the price was continuously at the Agency's selling price during any year the average of the prices for the chosen period would be raised, and so would lead to the upward revision of buying and selling prices in the succeeding year.

The advantage of this system is that it is very flexible, since by varying the number of years incorporated in the average, and by varying the margin between buying and selling prices, the Agency can secure larger or smaller variations of prices, whichever is desired. If it desires to increase the long-run movement of prices it can do so by taking a smaller number of years into the moving average, and at the same time narrowing the margin. If, on the other hand, it wishes to increase the short-run variability, at the same time maintaining a more stable average level of prices, it should widen the margin, and at the same time include a larger number of years in the average. The larger number of years would tend to make the average more stable, thus counteracting the effect of the larger fluctuations in the short run.

If this system is accepted it is necessary to consider the range of price variations which should be allowed. How stable should the Agency attempt to keep the moving average or pivot price, and what margins

should be allowed above and below the pivot price? It is reasonable to regard the margin between buying and selling prices as taking care of the short-period fluctuations of production due to the weather or other unpredictable hazards of nature. Movements of the average or pivot price should be made in response to longer-term movements of prices, for example, in response to cyclical changes in demand and supply, and in response to long-term trends of demand and supply.

Let us first consider short period variations in prices.

A large proportion of the fluctuations in output of agricultural commodities are the result of variations in the yield per acre which are due to natural causes. Such variations do not give rise to proportionate variations in agricultural costs, since a large proportion of agricultural costs is fixed whatever the size of the harvest. The farmer must incur the same expenditure regardless of the final yield. The only items of his costs which will vary in proportion to the size of the harvest will be the actual cost of harvesting the crop, the seed used, and possibly the fertilizers. Thus it follows that the cost per unit of a large crop will be lower than the cost per unit of a small crop. A constant price would therefore give a fluctuating income. If it is desired to make the farmer's income more stable the price must be allowed to fluctuate inversely with the yield per acre or with total production.

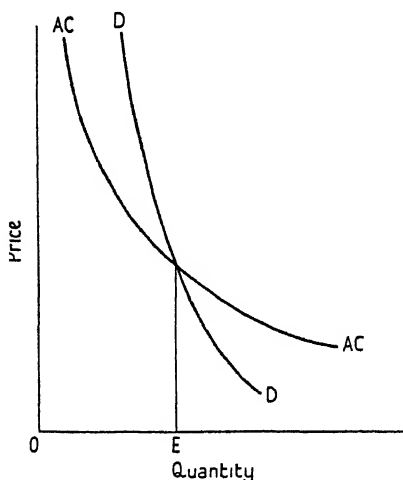


FIG. 2

In Fig. 2 let AC represent the average cost of production per unit of varying harvests of any particular product. This curve represents the industry as a whole and could be broken down into a large number of curves, one for each producer, each one of which would be at a different level. The curve which has been drawn is an abstraction which is useful for the exposition of the problem.

If DD is the demand curve, in the absence of a buffer stock it follows that any amount of the commodity which is produced greater than OE on the diagram will involve the farmers as a whole in losses on their total costs but not necessarily on their prime costs.

Similarly, the production of an amount less than OE involves profits. In the long run the condition of equilibrium of the industry is that profits and losses cancel out so that, on the average, production is sufficient to meet the normal demand. If production tends to be greater than OE more

often than it is smaller, the resulting losses should drive out high cost producers and a state of equilibrium should eventually be reached. But the equilibrium will be one in which the income of the farmers is very variable, and this is one of the instabilities of the system which it is desired to overcome. The effect of the introduction of a buffer stock is demonstrated with the aid of Fig. 3.

Let the Agency's buying and selling prices be represented by BB and SS , the market demand curve as DD , and the average cost curve as defined above by AC . If the amount OR is produced no difficulties arise, for the price just covers the cost of production per unit. The production of any amount between OR and OT will cause losses, and any amount

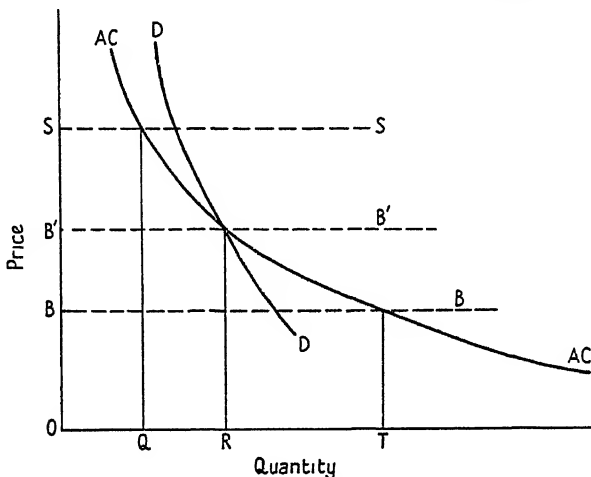


FIG. 3

greater than OT will yield profits. Similarly any amount produced between OQ and OR will yield profits and anything less than OQ will cause losses.

If crops vary regularly between OQ and OT any narrowing of the margin will increase the profits derived from large crops and reduce the profits derived from small ones. The total profits from large crops will tend to be greater than the losses from small crops, since the loss per unit has to be multiplied by a smaller number of units of output. Thus, if the margin is too narrow farmers will tend in the long run to make more than normal profits, and an expansionary force will have been introduced.

The aim of the buffer stock Agency should be to avoid large profits on large crops, and this entails fixing the margins with reference to the normal variations of yield per acre. Thus, if production normally fluctuates between OQ and OT in Fig. 3, the buying and selling prices of the Agency shown on the diagram would be reasonable since they would minimize the

danger of excessive profits caused by abnormally large harvests greater than OT . Thus the margin will be different for different commodities. For example, for coffee the margin should be very wide since production varies enormously from year to year. For wheat the margin could be much narrower since fluctuations in yield per acre, taking the chief exporting countries as a group, are much less violent.

It is not possible to eliminate entirely the losses made from outputs between OR and OT , but in the absence of a buffer stock agency losses would be made for any output beyond OR . By shifting the buying price in relation to the normal equilibrium price the losses can be minimized. For example, if BB was raised to B^1B^1 it is clear that the production of any surplus would yield profits. This is an excessively high level for BB and the correct position would be somewhat lower, so that surpluses caused farmers to make some losses; these would tend to be recouped out of the profits made on small harvests. If production tended continuously to exceed OB it would imply the existence of excess capacity in the industry and the losses made should force that capacity out of existence. If this does not occur, both buying and selling prices should be reduced, for the average price which is brought about by the Agency's operations is clearly higher than the long-run equilibrium price. This adjustment should come automatically through the operation of the pricing formula described above.

It is now necessary to turn to the question of the variations which are desirable in the average price. It is likely that the variations which are required to take account of short-run fluctuations would lead to the average price being too high during depressions and too low during booms. This would possibly lead to a favourable movement of the terms of trade for primary producers during depressions and an unfavourable one for them during booms. This would reverse the normal situation, but it is by no means clear that this would be desirable, and it is probable that the substitution of this new movement would create an entirely new set of problems as intractable as those with which we are trying to deal. Thus, some cyclical movement of the pivot price, and therefore of the buying and selling prices, is probably desirable, and the correct degree of cyclical fluctuation with a given margin would be attained by varying the number of years taken into the moving average in relation to the average duration of the cycles. The nearer the number of years approximated to the average length of the cycles, or a multiple of that length, the more damped would be the fluctuations.

One complicating factor should be noticed. If the buying and selling prices are revised annually, and the bulk of the selling takes place in a different year from the year in which the stocks were bought, an upward

movement of the buying and selling prices will tend to widen the effective margin between them, and a downward movement will tend to narrow the margin. Thus, if it is required to preserve the same effective margin, alterations to the number of years included in the moving average should be accompanied with changes in the margin between buying and selling prices in order to counteract the effect of a change in the variability of the moving average.

Further, the operation of the formula should be limited in such a way as to prevent the selling price from falling below the price at which the bulk of the stocks was bought, for if this occurs the Agency is making capital losses. Such losses imply a concealed subsidy to the producers of the commodity which should be avoided as far as possible.

So far we have not considered the proposition that the Agency should cover its operating costs out of the margin between buying and selling prices as a procedural safeguard to prevent extravagant price policies. This method of control has been suggested by Professor Riefler.¹

If, however, the formula is used in the way that has been suggested, no such safeguard will be necessary. But it might be argued that the storage costs should be covered out of the margin as a check upon the formula. That is, if the Agency were making net losses the formula ought to be revised. It is, of course, impossible to fix in advance a margin which would lead to the covering of costs, for this depends upon the rate of turnover of stocks. The lower the rate of turnover given the storage costs per unit of time, the wider must be the margin between buying and selling prices if costs are to be covered. But the rate of turnover can never be predicted in advance with any degree of accuracy: it can only be ascertained after a certain period has elapsed.

Once the Agency has experience it can fix its margin so that if the same rate of turnover is maintained costs will be covered. In this case the criterion of crop variation sets a minimum to the price margin. But if the rate of turnover were low the margin might have to be very wide, in which case some of the benefits of stabilization would be lost. It may therefore be more desirable for the Agency to make losses on its operating costs and be supported by a regular contribution from the countries participating in the scheme. The distribution of the financial burden is, however, more properly considered in connexion with the problem of financing the system, and will therefore be considered in that section.

¹ W. W. Riefler, 'A Proposal for an International Buffer Stock Agency', *Journal of Political Economy*, December 1946. Professor Riefler apparently thinks that it is possible to make satisfactory predictions of future trends of prices so that the only safeguard which would be required would be that the Agency cover its costs. 'The Agency would have to aim at doing its buying at prices sufficiently below the expected long term values to permit the cost of storage and interest to be recouped from later sales at higher prices' (p. 543).

The covering of costs out of the margin between buying and selling prices is, however, a secondary matter. It is of overriding importance that the price policy should be conducted in such a way as to inspire the confidence of the merchants and speculators in the markets. For this reason revision of the formula, as distinct from price changes in accordance with the formula, should be undertaken as rarely as possible and all concerned should be given ample warning of impending changes. Revision of prices according to the formula should take place once a growing-season. There is bound to be some speculative activity around the time of transition from one season to the next. But, by making the price changes in accordance with a formula which is known to all, such speculation would be reduced to a minimum. By fixing the buying and selling prices ahead for a growing-season the advantages claimed for the system of forward prices for agricultural products would be obtained, the chief of these being the ability of the producer to plan his production on a more rational basis.

For plantation crops, where the growing period is very long, our formula may be inadequate. It is essential that a close watch be kept upon the volume of new planting, the production from which will not affect prices until many years have passed. With these crops there is a case for some control over new planting which will prevent the development of excess capacity, if the buffer stock Agency fails to secure this result by preventing excessive increases in prices during periods of industrial boom. So far there has been little evidence that an adequate method of control which will facilitate the orderly growth of these industries has been devised. In fact, the limitations of human foresight are such that it is doubtful whether an ideal method of control could be devised. The problem, therefore, becomes one of avoiding the monopolistic exploitation of consumers, on the one hand, and the worst results of the operation of the price system on the other. The methods by which this might be achieved lie outside the scope of this paper; the important point is that buffer stocks alone may not be the complete solution to the problems of these industries.

There remains one final consideration which is of importance in any discussion of the pricing problems of a buffer stock Agency.

If there exists a state of long-term equilibrium between demand and supply before the Agency commences operations with any commodity, it may be necessary for the average level of prices to be lower than existed before, if they are made more stable. The instability of prices which previously existed meant that a certain risk premium was included in the long-period supply price. If the risks are removed or reduced, the effect is the same as if the price had been raised, and there would be a natural tendency for supply to increase. If, for example, the Agency operated a

scheme for wheat but not for barley and oats, there would be a tendency for substitution in production in favour of wheat to take place if the average price is unchanged, since producers would naturally tend to produce the crop which yielded the more certain income.

The Agency must be prepared, therefore, to have a lower average price for the crops with which it operates than existed before, or it must simultaneously limit the fluctuations of prices of each of a large group of commodities. For example, if it operates a buffer stock scheme for wheat it must be prepared to allow the average price of wheat to fall relatively to those of other grains. This would be brought about in the long run by the operation of the pricing formula, as supply increased. But it may be more desirable to operate simultaneously schemes for other grain crops, to avoid the danger of excess capacity in wheat production which may be difficult to remove once it has come into being.

The fact of the matter is that the farmer cannot both enjoy a more stable level of income, in the long run, and receive the same average income as before. If the income is made more certain it would naturally tend to be reduced either by a general reduction of agricultural prices through an increase of supply or by an increase of rents due to greater demand for land from new entrants. In fact, both forces are likely to be operative. The buffer stock Agency must see to it that there are no violent shifts of resources between the various types of agricultural production as a result of these factors. It is for this reason that it may be necessary for the Agency to operate with groups of related commodities rather than with isolated commodities.

Administration

The problem of administration is a twofold one. There is, first of all, the problem of raising the necessary finance at interest rates which will be low enough to keep the total costs of operations within reasonable limits. The second problem is to secure a form of organization which will be able to pursue a price policy which is independent of political considerations.

The financial arrangements will depend largely upon the form of organization, and so there is good reason to postpone the discussion of finance until after the administrative arrangements have been discussed.

The problem of devising a suitable form of organization capable of pursuing a reasonable price policy rests on the difficulty of obtaining a body which will be politically powerful enough to revise prices in a downward direction should this be necessary. When prices are determined by market forces they are impersonal, non-political things, and, though governments may seek to influence them in various ways, there is no single body to which responsibility can be imputed if the price is unfavourable. If buffer

stocks are set up for important primary commodities the situation will be very different. The Agency will, in the way we have described, determine the limits between which prices will fluctuate, and thus it will appear that the Agency is responsible for the average price of the commodity prevailing over some period of time. Even though it is the case that the Agency is powerless in the long run to hold average prices above the long-term equilibrium level, it will seem otherwise.

Thus, it follows that if the price of any important commodity is such as to cause hardship to any politically powerful group of producers, responsibility will be imputed to the Agency. The Agency will be subject, therefore, to considerable pressure never to lower its buying and selling prices and always to raise them as high as it can without alienating the importing countries. If the Agency succumbed to such pressure the result could only be the accumulation of ever-increasing stocks and the eventual breakdown of the system. Moreover, the breakdown of such a system would be accompanied by such disorganization of world markets that there would be little hope of anything but the return of restrictive agreements far more severe than anything which has appeared so far.

If changes in the buying and selling prices could only be made after protracted negotiations between the nations the system would be intolerably cumbersome, and it is clear that all the bad results of allowing prices to be determined by a political body would occur. It is an illusion to suppose that if both producing and consuming countries were equally represented at the negotiations some compromise would be reached which would approximate to the right prices. It is doubtful whether producers and consumers could be divided in such a way as to produce a 'neutral decision', for the countries likely to have the largest say in any such negotiations, Great Britain and the United States, are both subject to the pressure of producing and consuming interests.

In the United States the farm block is still very powerful, as recent events have demonstrated. Great Britain has to bear in mind the interests of the colonial dependencies, who are very important producers of primary products. She also has to take account of opinion in the Dominions, who are also important producers of raw commodities. The final result would be likely to depend, therefore, on the bargaining between nations, setting one interest against another, and there is little reason to suppose that this would lead to a reasonable price policy.

There are two possible methods of overcoming this difficulty. The first consists of attempting to remove price policy as far away from the political field as possible by entrusting the decisions to an executive body which has to work under certain conditions which would ensure that it did not pursue an extravagant price policy. The other method is to obtain agree-

ment to a formula, similar to that already described, which would allow the buying and selling prices to move in the direction required by long-run changes in demand and supply, and move automatically, so that a fresh decision was not required each time the Agency altered its buying and selling prices.

The first line of approach is exemplified in the suggestions made by Professor Riefler.¹ Professor Riefler advocates a form of organization similar to the I.M.F. in which consumer and producer interests would be balanced against one another. The executive authority would have the power to determine the buying and selling prices subject to the safeguard that the Agency should cover its operating costs. This would effectively prevent the Agency from following a policy which would lead to an artificially high level of prices. A further safeguard would be the provision that if the Agency accumulated a stock of any commodity greater than a specified amount, for example, an amount equivalent to two years' international trade in that commodity, a special inquiry should be held.

This is certainly an attractive idea which, if it could be adopted, would be a very effective safeguard against unrealistic policies. Unfortunately, it is not possible to accept the view that the problem of administration could be solved in this way. In the first place there are considerable practical difficulties in the way of any attempt to follow a consistent policy and at the same time cover operating costs. As we have already seen, the possibility of formulating in advance a price margin which would cover costs implies a degree of knowledge of the future which no organization can be expected to possess. Thus an *ad hoc* policy would be followed which would not have a sufficient degree of predictability to provide the confidence needed to make the scheme a success.

If it is once granted that the rate of turnover cannot be predicted in advance, then it is difficult to see what sort of control the covering of costs imposes. The implication is that if the turnover of stocks fell, the selling price should be raised to provide a wider margin. But in fact the opposite is required, since a fall in the turnover of stocks is a sign that both buying and selling prices are too high, and that they should both be lowered. This means that a loss must be made on the stocks already bought. All that the requirement that costs should be covered can mean is that, if losses are made, adjustments in the price margin should take place which should yield profits cancelling the losses. But this means that the price policy will be very unpredictable, and it will not necessarily secure the full advantages of price stabilization.

But even if this difficulty is accepted it is still doubtful whether a satisfactory organization could be obtained by giving the executive authority

¹ W. W. Riefler, *op. cit.*, pp. 541-3.

power to determine buying and selling prices subject to the proviso that costs should be covered in the long run.

The chief difficulty is that it is not clear at the outset of the scheme exactly what price policy would be pursued. It is very unlikely that the nations participating in the scheme would allow such important questions as the prices at which they could sell their exports or buy their imports to be decided by an executive agency upon principles, the implications of which were not clear at the commencement of the scheme. It is much more likely that they would reserve such decisions to themselves directly, and should it become clear that prices would need to be revised downward if the Agency was to avoid overburdening itself with excessive stocks, the exporting countries would press for restriction of production rather than acquiesce in lower prices.

The approach by way of a definite formula has the advantage that the nations participating in the scheme would have a definite idea of their commitments, and of the nature of the policy to be followed, before they committed themselves to the scheme. It would, of course, be necessary to make arrangements for the revision of the formula. A reasonable procedure would be to have a regular meeting of the representatives of the affected nations for the purpose of revising the formula if necessary. In this way the political pressures on the pricing policy would be directed to the question of the revision of the formula and would not be directed against the routine operations of the executive authority. Further necessary safeguards would be the provision that if a certain proportion of the participators in the scheme were dissatisfied with the way it was operating, they would have the power to summon a meeting to discuss the question of revising the formula. The executive authority of the Agency should have similar power if it is discovered that the formula in operation was leading to unsatisfactory results such as the making of capital losses.

One of the advantages derived from the introduction of the formula at the outset is that it makes clear the idea that buffer stocks should not attempt to do anything more than stabilize prices around the long-run equilibrium price. It might be argued that if this is made clear at the beginning there would be insufficient agreement among the nations to warrant the adoption of such a scheme internationally, particularly as it would do little to ease the problem of long-run structural change which was one of the motives inspiring the pre-war commodity control schemes. It could be maintained, with some degree of plausibility, that if the exporters knew that prices would be lowered if long-run conditions made it necessary, they would never support the scheme, but rather attempt to stabilize their incomes by the quantitative regulation of production.

If this is in fact the case it is very doubtful whether any buffer stocks scheme could be operated successfully. But there is certainly nothing to be gained from attempting to deceive the nations into adopting a scheme by having some vague principle to govern the operations of an executive authority who would then make all the real decisions of pricing policy. It must be emphasized that the price decisions of a buffer stock Agency are of the same order of importance as decisions governing the par rates of exchange made by the I.M.F. It is a delusion to suppose that it would be possible to entrust them to an executive authority not within the direct control of the participating countries.

Assuming agreement on a satisfactory set of governing principles the administrative framework could take the following form:

1. A governing body consisting of representatives of all countries concerned in the production and importation of the commodities for which it is desired to set up buffer stocks. It may be necessary to have separate bodies for separate commodities or for groups of commodities. There must be some contact between the various governing bodies to avoid the initial dangers of substitution in production mentioned earlier.

2. The voting power of this body would naturally be decided at the preliminary negotiations. A suitable system would be to weight the countries in proportion to their exports and imports of the commodity concerned, so that as far as possible, subject to the limitations already mentioned, producers and consumers would have an equal voice in the determination of the principles governing the operations of the Agency.

3. It would be the function of the governing board,

- (i) To work out the formula governing the buying and selling prices of the Agency for each of its products.
- (ii) To meet periodically to revise the formula, or whenever an extraordinary meeting was convened by a certain proportion of the voting power, or on request of the executive authority;
- (iii) To appoint an executive body.

4. The executive body would have the following functions:

- (i) Buying and selling the stated commodities at prices arrived at by reference to the formula agreed to by the governors.
- (ii) It would be required to publish an annual report on its operations.
- (iii) It would be required to convene a meeting of the governing body should it become apparent that the formula was not working satisfactorily.
- (iv) It would be charged with making all the purely technical decisions such as the provision for the insurance and storage of the commodities and the countries in which the stocks were to be held.

Financial Arrangements

The consideration of financing a buffer stock scheme falls into two parts: first, the problems connected with the raising of the capital sums to purchase the stocks and to construct any granaries which may be necessary; secondly, it is necessary to consider what arrangements must be made to provide the Agency with a regular income which will cover its operating costs and interest on its capital, in so far as these costs are not covered out of the margin between buying and selling prices.

The actual distribution of financial burdens will naturally be decided by the bargaining of interested countries at the outset of any scheme which is instituted. We can only put forward general principles which should govern the way in which the burdens are shared.

The purpose of the organization is to maintain the flow of foreign exchange from the major consumers of raw materials to the producers of those materials. It would seem reasonable, therefore, that the capital sums for the purchase of stocks should be provided by the industrial consumers. This could be done either by the provision of a long-term loan by the industrial consumers of raw materials, which could be used to set up a revolving fund to finance the purchases of the Agency, or the Agency could be given power to raise short-term loans on favourable terms as required, in the chief financial centres, namely, London and New York.

Possibly a combination of both methods could be used so that a revolving fund was raised at the beginning of the scheme which could be supplemented by short-term borrowing should the fund prove insufficient. It should be noted that the form in which the Agency holds its liquid assets is of great importance, since its operations which involve transforming those assets into goods are likely to have important effects upon the money markets of the countries in which these operations are taking place.¹ But this raises problems of great complexity, the consideration of which would require detailed analysis of the effects of the Agency's operations on the money markets concerned.

The financing of the construction of granaries should possibly be left to the producing countries. It is hardly reasonable to expect these items to be financed by the importers, and since it does not affect the contracyclical nature of the Agency's operations, their construction could well be left to the producers. In any case, this item should not be a large one.

The best method of securing to the Agency an income which would cover its costs would be a contribution from the producers in proportion to their production which would be sufficient to cover storage and interest charges. This would appear reasonable for two reasons. First it is equit-

¹ This was suggested to me by Mr. J. R. Hicks.

able that those who derive the most direct benefit from the organization should pay the direct costs, and, secondly, a very important check upon the operations of the Agency is provided. Any increase in the stocks held by the Agency will automatically increase the direct costs, and thus the funds which the producing countries have to contribute. The producers will not, therefore, be so enthusiastically in favour of the Agency maintaining an excessively high price level, since that will automatically involve them in additional expense. It might be necessary to modify this principle so that the producing countries contributed only a proportion of the interest charges. What is important, however, is that the fact that the operation of the system is not costless should be brought home to the exporters of raw commodities in as direct a manner as possible.

The Conditions necessary for the Success of Buffer Stock Schemes

If buffer stock schemes for primary raw materials are to operate successfully, two groups of conditions must be satisfied: (1) general trading conditions, and (2) demand and supply conditions for each of the commodities involved.

TRADING CONDITIONS. The satisfactory operation of an International Buffer Stock Agency of the type which has been considered depends upon the existence of a world market for the commodities concerned. Buyers and sellers must be indifferent whether they sell to or buy from the Agency or the market. In a world where there is a permanent shortage of dollars this condition is not realized. The effect of this is to limit the applicability of the Agency's buying and selling prices. If the Agency is financed from dollar sources there is a danger that producing countries would prefer to sell to it at its fixed buying price rather than to other countries at a price which is higher in terms of inconvertible currencies valued at the official rates. The Agency may, therefore, find itself accumulating unsaleable stocks. If the Agency is prepared to sell for inconvertible currencies its original dollar fund will be transformed eventually into inconvertible currencies which are useless for further operations. If they are made convertible by agreement, then the purchase of commodities from the buffer stock Agency will involve a net drain of dollars to the purchasers which they might be able to avoid by purchasing from other countries at a higher price in terms of inconvertible currencies.

These difficulties apply particularly with commodities produced both in the dollar and in the sterling area, and consumed partly in the dollar area and partly in the sterling area. For then the condition of indifference of the buyers between the sellers is not realized. The most important of

these commodities are wheat, cotton, and copper. On the other hand, the difficulties are less in the case of those commodities which are produced entirely outside the dollar area but sold partly to the U.S.A. and partly outside the dollar area. A good example of such a commodity is natural rubber. In such a case it might be possible to reach agreement on a system whereby the funds of the Agency were constituted in proportion to the sales of the commodity to the two currency groups. The practical difficulties are very great, however, and the operation of the system would need to be regulated by a much more comprehensive agreement than we have hitherto envisaged. But if such a scheme could be devised it would be of great assistance in maintaining the flow of dollars to rubber producers in the event of a severe slump in the United States.

Those commodities which are produced and traded for the most part within one currency group are amenable to treatment by means of buffer stocks even in the present unsatisfactory conditions. The most important example of such a commodity is coffee, which is produced mainly in South America and sold mainly to the United States. The problem of indifference discussed above does not arise here in any acute form, and the institution of a satisfactory buffer stock system for coffee would help to stabilize trade between North and South America.

These remarks suffice to show that there is only limited scope for a system of international buffer stocks in a world in which the pattern of trade is not governed by movements of relative prices but by bilateral agreements concluded regardless of relative prices. In such conditions of fixed exchange rates between currencies whose convertibility is limited, the prices of commodities in different countries have little meaning, and trading must be conducted on the basis of the relative bargaining strength of the countries concerned. It follows that the buying and selling prices of an International Buffer Stock Agency would have little meaning under those conditions.

A system of buffer stocks for storable primary commodities does offer the prospect of a more stable multilateral system of trading than has hitherto been possible and this renders the idea of multilateral trade more attractive. It is outside our purpose, however, to enter the controversy which centres around this issue, but there is room for doubt as to the ability of this country to maintain the present system of trading as a long-run proposition in the face of the growing hostility of the United States and other countries towards it.

Demand and Supply Conditions. Even if a multilateral system of trading is eventually restored, and agreement on the fundamental principles governing the conduct of International Buffer Stocks is achieved, there remains a further condition of success.

It is very important that there should not be a great deal of excess capacity in an industry the products of which are to be dealt with by the Agency. In theory the pricing formula could deal with such a situation by continuous reductions of buying and selling prices until high cost producers were eliminated. The buffer stock scheme does no more than rationalize the working of the price system by eliminating perverse fluctuations of prices.

One of the great errors of those who think that the price system is always capable of securing the correct distribution of resources, and who think that any form of control over production is necessarily anti-social, is their neglect of the great hardship which structural changes impose, particularly in industries where there is a large proportion of fixed costs and where the factors employed tend to be specific. Under such conditions, which are particularly prevalent in primary producing countries which specialize in a small range of products, prices and incomes must be reduced to very low levels before the excess capacity is reduced. If the marginal producers are highly localized no government can tolerate the poverty and hardship which may result. Moreover, even if economic forces are allowed to operate without interference it is not necessarily the most efficient who survive.

While cartel arrangements and restrictive agreements of the pre-war pattern cannot be regarded as a solution to the problems of structural change, buffer stocks are not a solution either. But granted an initial state of equilibrium, the instituting of buffer stocks should do much to prevent excess capacity from arising. For such maladjustments are to a considerable extent the result of excessive differences between the long-term and the short-term equilibrium prices in times of industrial boom. By preventing excessive increases of prices during boom periods one of the causes of over-investment will have been removed, and a more steady advance made possible. But though excessive investment may be checked by this means, little can be done to alleviate the effects of a radical change in demand brought about by the sudden appearance of a new product or by a radical change in tastes. In that case special measures may be necessary to transfer resources from the industry in an orderly way. The existence of buffer stocks may facilitate this process, but by themselves they cannot bring it about without grave hardship.

Conclusion

This discussion reveals the great importance of securing satisfactory economic conditions before attempts are made to institute buffer stocks. Premature attempts to set them up can only result in the failure of the system and the discrediting of the idea. It is important to recognize that

buffer stocks are not a satisfactory method of dealing with a situation in which there exists long-run excess capacity. Their importance lies in the hope they give of being able to reduce the short-run fluctuations in primary producers' incomes in a world of multilateral trading where non-discrimination is possible. This would in turn tend to stabilize the size of the markets for manufactured goods, thus making it much easier to follow internal policies of maintaining full employment. In this way the conflicting claims of full employment policies, and a more liberal system of trading may be reconciled.

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A NOTE ON THE THEORY OF CONSUMER'S BEHAVIOUR

By W. E. ARMSTRONG

IF the alternatives of choice confronting an individual had the convenient property of being completely ordered¹ by some property, a simple theory of choice could emerge, since the ordering property would determine one and only one alternative as highest in the ordered set and we could assume this to be the alternative chosen. If, on this theory, we use the term 'preference' for the relation between any pair of alternatives, all we need assume is that this relation is asymmetrical and transitive. An act of choice would then 'reveal' the existence of preference for the alternative chosen over all the other alternatives presented. So far as the theory of consumer's behaviour is concerned, no psychological inquiry into the nature of the preference-relation would be required—preference would be simply 'potential choice' needing no further characterization. The theory of choice would be simpler than either the preference or utility theories, owing to the absence of the relation of 'indifference' and of the necessity for a distinction between 'preference' and 'indifference', a distinction that can only be made by reference to the deliverances of introspection—the theory would also be 'objective' in a sense in which preference and utility theories are necessarily 'subjective'.

Unfortunately, a theory of the above kind is ruled out by purely logical considerations. If the alternatives of choice were variations in one dimension, e.g. variations in the quantity of one commodity, a complete ordering by preference would be possible, since we could assume a larger quantity to be preferred to a smaller, or indeed a smaller to a larger, and other odd rules can be imagined. That a complete ordering is possible follows from the fact that there are various ways of correlating, one to one, the number-continuum with itself, and the number-continuum is a convenient index of order. When, however, we have more than one dimension, e.g. when we have two commodities, each continuously variable, complete ordering becomes impossible. How can we correlate, one to one, a continuum of number-pairs with the number-continuum? What function of two continuous variables exists that is single-valued and non-repetitive? We must, therefore, assume for alternatives consisting of two or more commodities that the relation of preference does not always hold between alternatives, and therefore that choice does not necessarily reveal preference.

¹ I use the term 'complete ordering' for the ordering of a set, even though infinite, into classes of unit membership.

In a recent article¹ Mr. Little attempts to construct a theory of choice on the basis of revealed preference, but without the explicit assumption of a complete ordering by preference of all alternatives. He postulates that there are certain situations where we can assume choice to be determinate, and that the preferences thus revealed are sufficient for a theory of choice. Clearly it is possible to assume that a selected class of alternatives contains only one preferred alternative even if it is denied that alternatives are completely ordered. Mr. Little's postulate is that the market situation confronting an individual always gives rise to only one preferred alternative, a postulate that is logically unobjectionable. This means, to take the two-commodity case, represented diagrammatically in the usual way, that, of the alternatives represented by an area cut off by a downward-sloping straight line, there is one and only one preferred to the remainder in that area. By postulating also that a collection, that has more of at least one item and not less of any other items than has another collection, is preferred to the latter, it follows that the preferred alternative is a point on the above straight line.

An ingenious construction gives rise to what Mr. Little calls behaviour-lines, which have the properties that preference-theorists assign to indifference-curves. But Mr. Little's behaviour-lines really are indifference-curves, however much he may protest. They are logically implied by his postulates and they are lines of indeterminateness of choice and absence of preference. Furthermore, they do emerge from the assumptions made, unlike the indifference-curves of preference-theory, which do not result from the assumptions made on that theory, since the very notion of an indifference-class is a logical contradiction owing to the non-transitiveness of the psychological relation of indifference.²

The method of construction of a behaviour-line from a point A on a two-commodity diagram may be described as follows. Let θ be the \angle of the straight line on which A is the preferred point. Swing this straight line about A through the angle $\delta\theta$ and let B be the preferred point on this line. Swing the latter straight line about B by the angle $\delta\theta$, and let C be the preferred point on this line and continue with this operation until the line is vertical. A series of points, A, B, C, \dots results. As the angle $\delta\theta$ is made

¹ I. M. D. Little, 'A Reformulation of the Theory of Consumer's Behaviour' (*Oxford Economic Papers*, Jan. 1949).

² See my article, 'Determinateness of the Utility Function' (*Economic Journal*, Sept. 1939), where this point is developed. I also made the suggestion in this article (p. 457, footnote 2) that the preference theorist with a behaviourist bent might escape the difficulties inherent in the subjective concept of indifference by dropping the latter altogether and defining preference as choice. I assumed that a boundary between preferences and converse preferences could be found, rather like Mr. Little's behaviour-line, having similar properties to an indifference-curve. I was, however, mistaken in supposing such complete ordering to be possible.

smaller, we obtain an increased number of points, and the line connecting these points differs less and less from a smooth curve. As $\delta\theta \rightarrow 0$, the curve approximates to smoothness, being composed of an infinite number of straight lines, connecting an infinite number of points, i.e. there is a smooth curve which is the limit of the curve obtained by this repeated operation when the operations are infinite in number and each operation infinitesimal. It is important to realize, however, that this limiting curve cannot in fact be 'reached' by the construction, and the very fact that it is an unattainable limit shows that the curve is not a preference-line but a class of points between which the relation of preference does not hold. A confirmation of this characteristic of the behaviour-line is given by the reverse construction whereby a preference-line in the reverse direction can be constructed having identically the same limiting curve.

The fact that Mr. Little's behaviour-lines are indifference-curves (or curves of non-preference) does not make a great deal of difference to his thesis. For Mr. Little is only concerned with market behaviour, and indifference-curves fortunately are concave, so that the alternatives presented to individuals always have one and only one preferred alternative, and therefore the postulate of consistent behaviour or determinate choice is logically possible. But it is a serious theoretical objection to the theory that alternatives could be presented to an individual by an experimenting economist that would make nonsense of the above postulate—if an individual had to choose from the members of an indifference-class, we are forced to assume that his choice is indeterminate, i.e. is not determined by preference.

The great merit of Mr. Little's theory, provided that behaviour-lines are understood as indifference-curves, lies in its formulation of preference-theory in a way that does not fall down over the concept of indifference. Indifference becomes a transitive symmetrical relationship and the familiar diagrams of the preference-school come to have a meaning. Where the theory fails, however, is in its complete disregard for certain facts of human behaviour. In order to escape the supposed disadvantages of an appeal to introspection—in order to have the supposed advantages of an objective theory—we are asked to believe that choice is always capable of being determined by the nature of the alternatives presented. *A priori* considerations alone make it incredible that an individual should be provided with a mechanism so completely discriminating as to select one out of an infinite class of reactions in a determinate manner, as would be required if Mr. Little's theory were true; for, according to Mr. Little, we must suppose that, with money and commodities infinitely divisible, the choice of one particular combination is determined when an individual has a given sum of money to spend. The 'subjectivist' who supposes that it is only the

preferences of which an individual is aware that are relevant to such determination finds no evidence of such remarkable powers of discrimination and is therefore content to assume only a partial determination in such a case. He even finds that the individual often has difficulties in making decisions; that he is often indifferent between alternatives and makes a particular choice only because a choice has to be made. Even preference-theorists have been realistic on this point and by identifying indifference, as revealed by introspection, with the relation between the members of an indifference-class have undermined their own theory.

It would seem, then, that Mr. Little's reformulation of preference-theory fails, as any preference-theory that refuses to admit the quantitative variability of preference must fail. The non-transitiveness of indifference must be recognized and explained on any theory of choice, and the only explanation that seems to work is based on the imperfect powers of discrimination of the human mind whereby inequalities become recognizable only when of sufficient magnitude.

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THE COMMON SENSE OF INDIFFERENCE CURVES¹

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1. THE index-number approach to the theory of consumers' choice, as developed by Professor Samuelson in his formidable *Foundations of Economic Analysis*,² is undoubtedly a great advance in technique. Simply by comparing two sets of price-quantity data, results can be obtained which formerly required a knowledge of the complete preference field of the consumer. In the treatment of many problems, the indifference curve has given place to the budget line as an analytical tool. More recently it has been shown by Mr. Little³ and Professor Samuelson⁴ that the indifference curve itself can be derived by the budget-line technique. Moreover, it is claimed that such a method of derivation is logically more economical and scientifically more respectable than the usual method. It is against this last claim that I wish to protest here.

Although I have no objections to raise against the validity of the new method itself, it may be useful to give a brief account of it at the outset.⁵ In what follows only the simple two-commodity case will be considered. Let us take as a reference point a certain combination *A* of the two goods which is chosen in some price-income situation. Index-number theory now gives us a method of comparing *A* with other combinations chosen in other price-income situations; and we are able to delimit certain regions in the preference field. The combination *A* will be chosen rather than any point in one of these regions; while all points in a second region will be chosen rather than *A*. But there remains a third region, a region of ignorance, and a comparison with *A* of points within this last region does not enable us to reach any conclusion. We have discovered so much by comparing situation *A* with other points in the preference field each taken singly. We can narrow down our region of ignorance still further, however, if we are prepared to compare situation *A* with more than one other point at the same time. Thus, although the point *B* may lie within the region of ignorance relative to *A*, we may be able to find a point *C* lying outside this region which will give us information about *B*. The Little-Samuelson

¹ In the preparation of this article I have had the advantage of being able to discuss some of the points raised with a number of Oxford economists meeting under the auspices of Mr. and Mrs. J. R. Hicks. It is hardly necessary for me to add that I alone am responsible for the present form of the article.

² *H.U.P.*, 1947. Vide chaps. v and vi, especially pp. 107 et seq. and 146 et seq.

³ Little, 'A Reformulation of the Theory of Consumers' Behaviour', *Oxford Economic Papers* (New Series), vol. i, No. 1.

⁴ Samuelson, 'Consumption Theory in Terms of Revealed Preference', *Economica*, Nov. 1948.

⁵ For a fuller account I must refer the reader to the articles cited and especially to Samuelson, *Foundations of Economic Analysis*, pp. 146 et seq.

method of deriving the indifference curve consists in a continuation of this process to the limit. On certain assumptions the selection of an infinite number of intermediary points such as *C* enables us to narrow down the region of ignorance until the upper and lower limits to the region coincide, and become the indifference curve through *A*.

Professor Samuelson's proof of this coincidence of the upper and lower limits differs somewhat from that of Mr. Little: Mr. Little uses a very ingenious though complicated *reductio ad absurdum* argument, while Professor Samuelson has recourse to the theory of differential equations. But the proofs are in essence the same and rest, I believe, on the same assumptions. At this point it will be useful to state what these assumptions are, though detailed discussion of some of them will have to be postponed. They are:¹

1. The goods in question must be infinitely divisible, so that every point on the graph exists as a possible combination.
2. Every combination must be chosen in some price-income situation.
3. The final indifference curve must have a tangent at every point.
4. Larger collections of the goods are chosen rather than smaller. (One collection is larger than another if it contains more of one good and no less of the other.)
5. The consumer's behaviour must be consistent. This means (a) that if he once chooses *A* rather than *B* he must always choose *A* rather than *B*, and (b) that choice is a 'transitive relation', i.e. a choice of *A* rather than *B* and of *B* rather than *C* imply a choice of *A* rather than *C*.

Of these assumptions, the first two enable us to make use of the budget line through any point on the graph we care to choose, while the third ensures that there is only one budget line relative to such a point. The fourth is necessary if the budget line is to yield all the information we want from it. The fifth is clearly required if we are to obtain a regular and consistent indifference map from our price-quantity data, and we also want it in order to justify our use of intermediate points in the comparison of two points which cannot be directly compared.

In this last connexion it will be noted that the consistency assumption, as, indeed, the whole method of deriving the indifference curve on the above basis, involves a certain stretching of the meaning of the word 'choice'. For we require to be able to say, for example, that the point *A* will be

¹ I have taken the assumptions from Mr. Little's article, where they are collected on pp. 96-7. The assumption that the final indifference curve must have a tangent at every point (my third assumption) is, however, only to be found on p. 94. It will be noticed that I have made some minor changes in Mr. Little's formulation. For example, my first and second assumptions appeared in Mr. Little's article as a single assumption. Substantially, there is no difference between the two formulations.

chosen rather than the point *B*, even though the consumer can never be given the opportunity of choosing directly between them. As Mr. Little admits, this is not in accordance with normal usage.

Before concluding this very brief outline of the new method of deriving the indifference curve, I should like to draw attention to a difference of opinion between Mr. Little and Professor Samuelson as to the meaning to be attached to the indifference curve itself. Mr. Little believes that, so long as the indifference map is to be concerned with the consumer's behaviour and not with his likes and dislikes, the indifference curve can be regarded only as the result of a limiting process and can have no independent significance. In other words, the indifference curve through *A* is simply the dividing line between the region within which combinations would be chosen rather than *A* and the region containing points which would be rejected in favour of *A*. For this reason Mr. Little avoids the use of the term 'indifference curve' altogether.¹ On this point Professor Samuelson, as I understand him, disagrees, although the disagreement is revealed only in a footnote.² But, as is often the case, the footnote is an extremely significant one; and we shall be referring to it later.

2. What, then, are the advantages claimed for the new approach? As far as Mr. Little is concerned, there are two main ones. In the first place, he believes that consumers' behaviour, if it is consistent, should be explained without reference to anything else but that behaviour; and he argues that the new approach enables us to dispense with the subjective element which was inherent in the more direct method. Secondly, he claims that the new approach makes it possible to establish a well-behaved set of indifference curves with the help of fewer concepts and axioms than was hitherto possible. Professor Samuelson's standpoint is slightly different. He is anxious to build up the theory of consumers' choice on 'operationally meaningful' foundations. I take this to mean that he is not simply concerned with explaining consumers' behaviour in terms of behaviour, but that in particular he thinks it should be explained in terms of *market* behaviour. We shall have to consider each of these arguments in turn.

For my part, I do not wish at all to enter into the subjective-objective controversy. I shall not be concerned with the question whether making a map of the pattern of the consumer's behaviour is a more respectable occupation than trying to give a subjective explanation of why there is such a pattern. All that I should wish to suggest here is that the subjective element in the direct method of drawing up indifference curves is not indispensable to it, as Mr. Little appears to believe. Indeed, it will be shown that it is perfectly possible to avoid the use of subjective concepts

¹ Little, *op. cit.*, pp. 91 and 95.

² Samuelson, *Consumption Theory in Terms of Revealed Preference*, p. 248 n.

altogether and yet retain the simplicity and straightforwardness of the direct method.

Mr. Little reaches the conclusion he does after an examination of the concepts 'preference' and 'indifference'. Now it is quite true that in earlier writings on the subject a certain amount of ambiguity has attached to these terms; and Mr. Little has done a service in drawing attention to this. Thus the verb 'to prefer' may mean either 'to choose' or 'to like better'; and whether or not we follow Mr. Little in advocating the use of the first and objective meaning of the word, we must surely be agreed that it is advisable to keep the two meanings distinct. But when he comes to consider the concept 'indifference', he makes an assertion which is in my view hardly convincing. Let me quote: 'The trouble with 'indifference', as with preference in one sense, is that it is a subjective concept. There is certainly no obvious kind of market behaviour which can be called indifferent.'¹ But, surely, if there is no reason why the consumer should choose one combination rather than another—in other words, if he is indifferent between them—then he will exercise his choice in a random manner. And, although the meaning of indifferent behaviour will not be revealed so long as the consumer is allowed to choose between the two combinations only once, it will become perfectly clear if he is allowed to repeat his choice an indefinite number of times. Indifferent behaviour will mean simply that the consumer chooses the first combination on some occasions and the second combination on others; or more strictly that 50 per cent. of his choices will be for the first, and 50 per cent. for the second. It is reassuring to find this view shared by Professor Samuelson. For in the footnote referred to above he states:

'If our preference field does not have simple concavity—and why should it?—we may observe cases where *A* is preferred to *B* at some times, and *B* to *A* at others. If this is a pattern of consistency and not of chaos, we could choose to regard *A* and *B* as "indifferent" under those circumstances.'²

It is clear, however, that, if we are to make use of the discovery of an objective meaning to 'indifference', we must widen somewhat our consistency assumption. It is no longer feasible to assume that if *A* is once chosen rather than *B*, then it will always be chosen rather than *B*; nor that choice is a transitive relation. Our consistency assumption must now read thus: if *A* is always chosen rather than *B*, and *B* always rather than *C*, then *A* will always be chosen rather than *C*; again, if *A* is in the above sense indifferent to *B*, and *B* indifferent to *C*, then *A* will be indifferent to *C*; yet again, if *A* is always chosen rather than *B*, and *B* is indifferent to *C*, then *A* will always be chosen rather than *C*. This extension of the consistency assumption—not, I think, an unreasonable one—is amply

¹ Little, *op. cit.*, p. 92.

² Samuelson, *loc. cit.* My italics.

made up for by the fact that the concept 'choice' can now return to normal. Armed as we are with an objective definition of indifference, we are able to compare directly any two points in the preference field, even though the one may lie within the region of ignorance of the other as far as the index-number criterion is concerned. There is therefore no need to stretch the meaning of the verb 'to choose' in order to cover the case where two points cannot be compared without the help of intermediary points.

To conclude this section: there seems to be no justification for Mr Little's claim that the direct method of drawing up indifference curves is logically unsatisfactory because no meaning can be given to indifferent behaviour. Mr. Little's difficulties here are of his own making. It is his preoccupation with the transitive nature of choice which has prevented him from giving a meaning to indifferent behaviour. But once such a meaning has been established, the assumption that choice should be a transitive relation is seen to be superfluous.

3. At this point, the reader will, I trust, permit a short digression. Its insertion is necessary in case it should be thought that our theory of consumers' choice has been halted at a not too comfortable half-way house. Certainly the realization that indifferent behaviour means random behaviour has opened up new territories of thought which cannot go entirely unexplored. If it is conceded that in order to attach a meaning to indifferent behaviour the consumer must be allowed to repeat his choice an indefinite number of times, why—it may be asked—should we not develop a theory of consumers' behaviour based on frequency or probability of choice? Indeed, such a theory would have many attractions: it is the logical outcome of the behaviourist approach; it is in line with recent developments in the physical sciences; finally, it would re-establish something very similar to the theory of measurable utility, with utility having an objective rather than a subjective significance. Nevertheless, I am inclined to resist such a development. The consistency assumption, which must be the foundation of any theory of consumers' behaviour, seems to me altogether too unrealistic to be able to support so elaborate a superstructure.

Obviously the whole question merits much fuller discussion; and the above remarks are put forward only as 'first thoughts'. I am convinced, however, that in the last resort it is simply a matter of choice which theory we adopt. One of the fascinations of the 'science' of economics is that it is not a science, however much it may borrow from scientific method. The necessity for compromise is always present. In what respectable science would the assumption of consistency be accepted for one moment? Yet it is difficult to see how our theory can serve any useful purpose unless

consistency in some form is postulated.¹ It is a commonplace for the economist to speak of his box of tools—but have the implications of the metaphor always been recognized?

4. It is time—perhaps high time—for us to return to Mr. Little. The second argument he puts forward in favour of the budget-line approach is that it enables us to set up an indifference map with the use of fewer concepts and axioms than the direct method. It is true that in his reformulation Mr. Little manages to dispense with some of the concepts and axioms which were formerly employed; but this economy is made possible not as a result of his change of method but rather because he is not concerned with providing a subjective explanation of consumers' behaviour.² If it is thought desirable to give some such explanation, then, of course, use must be made of the subjective concepts 'preference' and 'indifference' and of the axiom that the consumer always chooses what he prefers. These are no longer necessary, however, if like Mr. Little we are interested only in making a map of consumers' behaviour. Now that we are in a position to compare objectively our reference point *A* with any other point on the graph, it is possible for us to draw up some sort of indifference map with nothing more than the concept 'choice' and the assumption of consistency as restated above. And if, on the other hand, we wish to draw up a well-behaved set of indifference curves, i.e. a set of continuous curves running in a north-west to south-east direction and concave upwards, we certainly do not require any more axioms than Mr. Little himself uses.

It may be useful to set out the steps of the argument without going into formal proofs. Using the concept 'choice' and starting from a reference point *A*, we make the following assumptions:

1. The goods must be infinitely divisible.
2. Larger collections of the goods are always chosen rather than smaller.
3. The consumer's behaviour must be consistent in our new sense.

From these three assumptions we obtain the result that the indifference locus is a continuous curve running in a north-west to south-east direction. To complete our task we need only add a fourth assumption:

4. Every combination must be chosen in some price-income situation.

With the help of this last assumption it is easy to prove by *reductio ad absurdum* that the indifference locus through *A* must be concave. This is all that is required. By changing our reference point we can draw up

¹ For this reason I am also inclined to resist the development of the theory of consumers' behaviour along the lines suggested by Mr. Armstrong ('Uncertainty and the Utility Function', *E.J.*, March 1948). By denying consistent behaviour Mr. Armstrong no doubt makes the theory more realistic, but at the same time he destroys much of its usefulness.

² I do not wish to suggest by this that Mr. Little necessarily held the opposite view. Some clarification of the matter, however, seemed to me desirable.

other indifference curves with the same properties, and our consistency assumption will ensure that they never cut.

It will be observed that apart from the consistency assumption, which has had to be restated, all these assumptions are among those required by Mr. Little. Moreover, we have not found it necessary to assume that the final indifference curve should have a tangent at every point. Provided the indifference curves are continuous and concave, a determinate solution will exist for every price-income situation. The question whether the curves are smooth or kinked is not one of any importance. It would seem, then, that if the game of counting axioms is to be played, the direct method has the advantage over the budget-line approach.¹

One further point to be noted is that we are able to prove the concavity of indifference curves as a theorem; although I confess I do not see why Mr. Little regards this as an advantage. It seems to me immaterial whether we state that indifference curves are concave and prove that every combination must be chosen in some price-income situation or whether, contrariwise, we state that every combination must be chosen in some price-income situation and prove the concavity of indifference curves.

5. We have come to the last part of our programme. We have seen that it is possible to dispense with the subjective element in the theory of consumers' choice and yet retain the directness of the earlier method of drawing up indifference curves. We can draw up the whole pattern of the consumer's choice by confronting him in turn with pairs of combinations and asking him to choose between them, the experiment being repeated an indefinite number of times. Professor Samuelson would argue, I think, that this procedure is not yet entirely satisfactory, because we are asking the consumer to make his choice as it were *in vacuo*. He believes that the great merit of the budget-line approach is that the consumer is made to reveal his pattern of choice by his own market behaviour. Although there is much that is attractive in this view, I do not believe it is possible to adhere to it strictly. The fact that in a given price-income situation the consumer chooses, say, the combination *A* in itself reveals very little. It tells us only that no other point on the budget line will always be chosen rather than *A*. When we have made the assumption that every combination will be chosen in some price-income situation, the market behaviour of the consumer gives us some more information. If we select the price-income situation in which *A* will be chosen, we know that *A* will always be chosen rather than any other point on the budget line. As yet, however, we have no means of comparing *A* with points to the left of the budget

¹ Possibly this particular assumption is not essential to Mr. Little's *reductio ad absurdum* proof or to Professor Samuelson's mathematical demonstration. But to discard the assumption, if it were possible to do so, would certainly add to the complication of their treatment.

line. Thus, since we know the slope of the budget line relevant to every point on the graph, we may be able to solve the differential equation and determine the set of indifference curves; but we have no means of establishing the concavity of the indifference curves, unless we devise a means of comparing a point chosen with the points lying to the left of its budget line. In order to do this, we must assume that larger collections of the two goods are always chosen rather than smaller. But in making this assumption we are selling the pass. The consumer will not be confronted in a market situation with a choice between larger and smaller collections, so that in order to make use of the assumption we must also postulate consistency between his choice in market situations and his choice *in vacuo*. Once this is admitted, there is no reason why we should not ask the consumer to make his choice *in vacuo* in any case.

It might be contended that the fact that the consumer does not choose a combination and then burn or throw away some of it is sufficient ground for believing that when the consumer chooses a particular combination he is choosing it not only instead of any other point on his budget line, but also instead of any combination lying inside his budget line. This, however, does not meet the case of goods which are not disposable in this way. Nor is it possible to evade the problem by arguing that the proposition that larger collections of goods will be chosen rather than smaller follows from the definition of an economic good. This would involve circular reasoning, since the only possible objective definition of an economic good is that it is one of which larger amounts are chosen rather than smaller.

The above argument applies only to the particular case where it is desired to prove the concavity of the indifference curves. If it is not desired to prove this, no objection can be raised against Professor Samuelson's method. It will be recalled, however, that it is not our primary intention in this article to criticize the Little-Samuelson approach—except on the grounds that it is difficult and complicated. All we set out to do was to justify the direct method. The following consideration may therefore be thought sufficient for our purposes.¹ Has not Professor Samuelson interpreted market behaviour perhaps too narrowly? In economic life it is not always possible to purchase any quantity of a commodity at a given market-price. Offers for sale can take several forms, and can have conditions of different kinds attached to them. For example, the consumer may be required to purchase a certain quantity of a commodity at a certain price or none at all. If this form of transaction is included in market behaviour, then our consumer will not have to make his choices *in vacuo*; for it will always be possible to make an offer to him which will present

¹ I am indebted to Mr. Hicks for this suggestion.

him with a choice between our reference point and any other point on the graph. The divorce between the direct method and market behaviour is not really so great as Professor Samuelson implies.

6. When in *Foundations of Economic Analysis* Professor Samuelson suggested that under favourable circumstances the indifference curve might be derived from the budget line, he appeared to be concerned simply with tying up his index-number theory with earlier indifference-curve theory. One felt his object was to reassure the reader rather than convert him to a new approach. I think it a pity that in his more recent article he should have given the budget-line approach greater pretensions. Mathematics is no doubt a fascinating science, but I should not like to think the time had come when the student had to understand what a differential equation was before he could understand what an indifference curve was. I should very much prefer to think that Professor Benham's soldier with his rum and cigarettes¹ had become sufficiently long in the tooth for the familiar adage to apply to him.

¹ Benham, *Economics* (Pitman, 2nd ed.), Appendix to Book I.

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THE THEORY OF CONSUMER'S BEHAVIOUR— A COMMENT

By I. M. D. LITTLE

MR. ARMSTRONG states, in the article above, that a theory of consumer's behaviour which depends on the complete orderability of all possible alternatives by the relation of preference can be ruled out by purely logical considerations. The consideration advanced is that, when we are dealing with a two-good case, we have a continuum of number-pairs; and such a continuum cannot be correlated one-to-one with the number-continuum.

But why is a one-to-one correlation with the number-continuum essential to a complete ordering of all possibilities? Why should they not be correlated with a number-pair continuum? Every point on a two-good map can have a double reference, first to the 'behaviour-line' to which it belongs, and second to its order of choice among the points on that line.

Thus, I would not claim it as an advantage for the budget-line approach that it avoids 'the explicit assumption of a complete ordering by preference of all alternatives'. But it must be admitted that if the points on a 'behaviour line' are ordered, then this order could not be discovered by the budget-line method of construction. Thus, Professor Samuelson states 'the points lying literally on a (concave) frontier locus can never themselves be revealed to be better or worse than A . If we wish then we may speak of them as being indifferent to A .'¹ This is only true given that the budget-line method is the only conceivable one (even then, Professor Samuelson would, I think, agree that the term 'indifferent' was, in his language, 'operationally meaningless'—it would also be misleading). But then the budget-line construction is certainly not the only conceivable method. One could, in principle, give the consumer a direct choice between any two collections, presented as free alternatives. The points on a 'frontier-locus' must then be ordered, if choice is assumed to be transitive.

Mr. Armstrong goes on to say: 'Where the theory fails, however, is in its complete disregard for certain facts of human behaviour.' No one can possibly disagree with Mr. Armstrong about the disregard of the 'theory' for many kinds of facts. But whether the theory fails or not depends on what its purpose is. As I see it, the *only* purpose of the system² is to provide a basis for the deduction of welfare conclusions. The obvious unreality of

¹ P. A. Samuelson, 'Consumption Theory in Terms of Revealed Preference', *Economica*, Nov. 1948, p. 251.

² The fact that we usually speak of a theory of consumer's behaviour (or demand) is perhaps unfortunate; it seems to suggest that it is meant to explain why people behave as they do. Since it cannot reasonably be thought of as an explanation in this sense, let us rather call it the *system* of economic behaviour.

the system makes such conclusions somewhat shaky. But it is probably not so utterly unrealistic that the resultant conclusions are worthless, on that account alone. We must, of course, agree that a more realistic system would result in more trustworthy deductions. But, unfortunately, no one has evolved any other system, which results in any definite welfare conclusions, different to those which (with some other postulates) are deducible from the ordinal utility system.

Discussions of the reality and unreality of the ordinal utility system are certainly useful, because they have a direct bearing on the important, and little discussed, question of the reality of welfare economics. But I see no point in trying to set up any alternative system. If such a system is to lead to any definite non-formal conclusions, it must be static and it must ignore risks. It is probably better to put forward for discussion definite conclusions, even if we finally decide that they are not to be trusted, rather than have no conclusions at all. Mr. Armstrong concludes that my reformulation of 'preference theory' fails. But it cannot fail to do what it was never meant to do—that is, explain how people decide what things to buy. A reformulation, or reinterpretation, of a theory may succeed or fail to clarify the question what the theory is about, or what sort of a theory it is. It cannot succeed or fail to do anything more than that.

Mr. Kennedy does not, I feel, describe my beliefs very accurately in the preceding article. In particular, he states: 'Mr. Little believes that, so long as the indifference map is to be concerned with the consumer's behaviour and not with his likes and dislikes, the indifference curve can be regarded only as the result of a limiting process and can have no independent significance.' I do not believe this. Certainly if indifferent behaviour is clearly defined, then, of course, the system could be held to be about economic behaviour. Mr. Kennedy himself attempts such a definition; for reasons given below, I think he fails. But even so indifferent behaviour *could* be defined (though not, I think, conveniently or satisfactorily), in which case the 'utility curves' would acquire a meaning which was independent of any limiting process. Mr. Kennedy also suggests that I believe 'that the subjective element in the direct method of drawing up indifference curves is indispensable to it'. This is, of course, not true if indifferent behaviour is defined. Moreover, it is not quite clear what is meant by 'direct'. The following is a sketch of a method of construction which involves no subjective element, but which seems to be reasonably 'direct': the individual is asked to say, of every collection, that he would take it rather than A , or that he would take A rather than it. Then given the usual axioms we have the 'utility' curve through A as the boundary of the 'superior' and 'inferior' areas. The method is direct in that it avoids the complexity of the budget-line construction. This method has

several advantages: (a) it is simple to explain, (b) it permits utility curves of any shape, and (c) every conceivable point can in principle be brought into relation with *A*.

Mr. Kennedy seems to me to have two aims: (a) for pedagogic reasons he wants an easily understandable method of construction, and (b) he wants to reintroduce the word 'indifference'. With the first of these I sympathize. But it seems to me that the two aims are distinct. We can have a very simple method of construction without reintroducing 'indifference'.

Mr. Kennedy seeks to define indifferent behaviour as random behaviour. If the consumer is indifferent between *A* and *B*, then '50 per cent. of his choices will be for the first, and 50 per cent. for the second'. He states: 'We can draw up the whole pattern of the consumer's choice by confronting him in turn with pairs of combinations, and asking him to choose between them. *the experiment being repeated an indefinite number of times.*'¹ But what is 50 per cent. of an indefinitely large number? Perhaps Mr. Kennedy would say that the behaviour was random or indifferent if the proportion of *A*'s would converge on the value $\frac{1}{2}$ if continued indefinitely. But this won't do, because there is no conceivable way of knowing if an irregular series would be convergent if continued indefinitely.

The above difficulty is the same as that which has been held to upset R. von Mises's definition of probability. To quote:

'For the pure mathematician the notion of convergence is applicable only to infinite series constructed according to rule, e.g. the sequence $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \dots$. The sequences which interest von Mises are, however, of a very different kind. . . . They are ruleless sequences, in which it is impossible to calculate the terms in advance from any general formula and impossible to prove *a priori* that they converge to a limit. . . . One consequence of the combination of convergence and irregularity in the frequency theory of probability is that probability statements interpreted according to this theory must be both unverifiable and unfalsifiable. They cannot be verified *a priori*, because they refer to irregular sequences; and they cannot be verified *a posteriori* because they refer to infinite sequences. Similarly, they cannot be falsified in any way, because from consideration of a finite stretch, however long, we can never infer with certainty that an infinite but irregular sequence will not converge to some fixed limit.'²

Thus, to define indifferent behaviour as random behaviour does not help, because random behaviour cannot be defined. We should always be in a state of infinite suspense as to whether to say that Mr. Kennedy's consumer preferred one combination to the other, or was indifferent between them.

But anyway, what is the point of insisting on indifference? There does not seem to be any pedagogic gain. Can it be thought that there is some

¹ My italics.

² W. Kneale, *Probability and Induction*, Oxford, 1949, pp. 157-9.

gain in realism? Surely not; any ordinary man would be indifferent (in the everyday, couldn't-care-less, sense) between many more combinations than those on a line. Calling such combinations indifferent is merely paying lip-service to reality. Against the concept I offer the following three reasons: (a) indifferent behaviour cannot be satisfactorily defined, (b) the word suggests that the ordinal utility system has something to do with a psychological explanation of behaviour, and (c) it is unnecessary, and should therefore go.

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SOME ASPECTS OF COMPETITION IN RETAIL TRADE

By P. W. S. ANDREWS

1. Introductory

Most economists would agree that, in some sense or another, modern retailing is a competitive industry. At the same time we have come to stress the extent to which the force of its competition is mitigated by what are regarded as elements of monopoly. In fact, the recognition of these 'monopolistic' factors in the sale of consumers' goods has been largely responsible for the ease with which the modern theory of monopolistic competition has come to be taken as applicable not only to retail trade but to business in general.¹ I have argued elsewhere that, so far as manufacturing industry is concerned, some of the important implications of that theory are false (e.g. the restrictive determination of outputs by reference to marginal revenues and costs), and that some of its basic assumptions are incorrect (e.g. those concerning the shape of the cost-curves, and the way in which differentiation of the market works). In this paper I shall argue that we should also reconsider the present ready application of this body of doctrine to retail trade.

Some recent correspondence about these matters leads me to believe that it may be of interest to consider certain features of retail trade which have contributed to a widespread suspicion of the extent to which it serves the social interest. These features, which are enumerated below, are all present in the case of many branded consumers' goods and, separately or together, are to be found in other sections of retail trade:

1. *Price Rigidity.* The exposition of the fundamental features of a 'purely competitive' market, especially in the elementary statements of economic doctrine which have most influenced general thinking on these matters, proceed in terms of a great flexibility of market price, in accordance with the shifting balance between demand and supply. Such flexibility is obviously absent from most sections of the retail trade in manufactured products. Further, the income of the retailer proper is obtained from a gross profit margin which remains remarkably constant (for any given section of retail trade) as a proportion of the price at which he resells these products.
2. *Resale Price Maintenance.* Not only are many retail prices not flexible in this sense, in many cases they are fixed by the manufacturers, and, equally, whether this is so or not, there are many cases where the

¹ Before these theories appeared it had already become usual to analyse industries as if they were producing consumers' goods sold to the consumers. In England this largely originates with Marshall (see *Principles*, pp. 92 and 340).

retail prices of consumers' goods remain remarkably constant over fairly long periods—these last are usually referred to as cases of 'conventional prices'.

3. *Advertising*. This is of especial importance in retail trade, and may make up a substantial proportion of the costs of branded consumers' goods.

Subsequent sections of this paper will therefore discuss how far the 'higgling' of a market, or the flexibility of its price in the short run, are to be required as evidence of its competitiveness; from this we shall turn to the explanation of the indexibility of the prices of manufactured goods and shall argue that this results from certain basic factors in manufacture and in retail trade which present no obstacle to competition; the next section will consider the question of conventional prices; the following will discuss the economics of branding and of price maintenance by manufacturers: finally, we shall ask how far advertising is a necessary cost in retail trade, rather than a waste which ought to be avoided, and how far it leads to prices which are higher than they would be in its absence.¹

2. 'Higgling' and variability of price as criteria of competition

Strictly speaking, 'higgling' refers to the chaffering between dealers and their customers which takes place in primitive and undeveloped markets—what our language used to call the 'cheapening of the market'.

¹ Since I shall wish to argue as directly as possible, I shall not make detailed reference to particular theorists. The theory on which my argument is broadly based has been given in greater detail in its application to the economics of manufacture in my book *Manufacturing Business*. When I refer to the older economists, with whose general industrial analysis I am in sympathy, I am thinking especially of the neo-classical theory which culminated in Alfred Marshall's *Principles* and *Industry and Trade*. I should perhaps note that I have made a more detailed examination of Marshall's theory and of the post-Marshallian development of the theory of business in an essay which I have contributed to *Oxford Studies in the Price System*, to be published by the Clarendon Press later this year. When I refer to the modern theories of business behaviour, I am thinking especially of the doctrines which had their origin in the discussions in the *Economic Journal*, 1928-33, to which many economists contributed. These resulted in Professor Chamberlin's *Monopolistic Competition* and Mrs. Joan Robinson's *Economics of Imperfect Competition*. These basic theories have been developed by Mr. Kalecki in his *Essays in the Theory of Industrial Fluctuations*, where the concept of the 'degree of monopoly' in the system has assumed great importance; and by Messrs. Hall and Hitch in an article which modified the theory in order to incorporate certain features of the determination of prices in practice, which had been discovered during the research of the pre-war Oxford Economists' Research Group: 'Price Theory and Business Behaviour' (*Oxford Economic Papers* (Old Series), No. 2, 1938). A recent application of these modern theories to retail trade will be found in Mrs. Margaret Hall's *Distributive Trading*; Mr. Henry Smith's *Retail Distribution* may also be referred to. The most important study of advertising in practice will be found in *Statistical Analysis of Advertising Expenditure*, by Messrs. Kaldor and Silverman. *Economics of Advertising*, by Mr. F. P. Bishop, states the viewpoint of one with considerable practical experience; this supports the theory that I have put forward. For a very recent factual study of distribution the reader is referred to Mr. Jefferys's *The Distribution of Consumer Goods*, which was published while this article was in the press.

It is probably the sound of the word which has been responsible for it sometimes being used as applying to the short-run variability or instability of price which is a feature of some markets. We shall first consider 'higgling' in the strict sense and shall discuss the question of the variability of market price later on as a separate issue; in each case the question is how far 'higgling' is to be taken as a sign of the competitiveness of a market.

'Higgling' may sometimes be met with in the weekly markets of country towns, where the vendors of underwear and the like and their customers occasionally treat price as a matter to be settled between them. Bargaining here preserves some of the atmosphere of a social occasion, enjoyed with comparative leisureliness, which is still a characteristic of marketing in backward areas of the world. But it is not, and could not be, a regular feature of the selling of manufactured goods—not in an industrial country where production is on a large scale and where retail and other markets are consequently organized for the movement of relatively large quantities of products. Not only would modern business and its customers have little time for 'haggling' and 'higgling'; markets tend to organize themselves on the basis of normal price-cost-quality relationships. In these circumstances a 'higgling' market would make for higher prices because it would increase the costs of trading.

'Higgling' arises, even to-day, as a normal feature where the particular specimens of a commodity which are dealt in at any one time have each some aspect of uniqueness, their qualities being variable or displaying peculiarities. In such cases strictly equivalent goods come on the market rather infrequently, and such markets are essentially dealers' markets. Horse trading is, perhaps, the best (and proverbial) example of what I have in mind, but 'higgling' is also a normal method of buying and selling the more valuable classes of antiques, pictures, &c. A horse or an old master is 'worth what it will fetch'¹ and the dealer in such a commodity will try to buy it as cheaply, and to sell it as dearly, as he can. But 'higgling' does not usually operate, even in the second-hand market, for articles whose qualities and descriptions are frequently encountered. In large centres of population, at all events, where the dealers of this kind have to meet regular competition, one will find that they behave like the retailers of new goods—selling on a quoted price basis. Given the demand and supply conditions in the market, much the same price will prevail for any one type of article, and its dealers will buy and sell at prices which give them whatever gross profit margin has come to be normal. When prices change owing to changes in the fundamental conditions of the market, dealers will make abnormally low or high profits on the stocks which they

¹ As a second-hand dealer first said to me when I offered 1s. 6d. for a painting and he stuck out for 2s. 6d.!

already hold, but their buying prices for newly purchased articles will change with the selling price.

Competition, then, tends to make for a uniformity of price and 'higgling' should rather be taken as a sign of an *uncompetitive* market, or of one whose trading is not sufficiently regular for normal values to become quickly established.

Variability of price¹

Apart from 'higgling', the markets we have been discussing have another characteristic which is often taken as being a sign of competition: quick variations in price levels with changes in the strengths of demand and supply. It is true that this sort of variability does exist in one sort of competitive market and that it has, apparently, developed with the increase in the competitiveness of such a market. It is, however, no more a general sign of the competitiveness of a market than is the 'higgling' of which we have been speaking.

Short-term price is very flexible in what are often referred to as the great commodity markets—those for primary commodities such as grains and crude oil—as well as those for regularly dealt-in stock exchange securities. The prices for such things are established through the competition of buyers and sellers, but are determined largely through the speculative activities of dealers who will buy or sell according to their view of the market at any given time. It does mean something to analyse such markets on the basis of normal prices, but these take time to control the market. From day to day and over short periods, price will be much more affected by temporary changes in the balance of demand and supply.

This is so because the total supply in existence of such commodities is not so quickly altered as is the case with manufactured commodities. Demand, however, is subject to considerable short-period variation, and, at different times, will press heavily on available supplies or will leave a margin of supplies not taken up. It is an important function of the 'speculative' dealer to take up any such temporary excesses and to hold stocks with which to help meet any temporary deficits of supply. The variability of market price plays its part in inducing him to perform his functions without which markets of this type could not carry on. There is, however, no reason for considering the social justification of this kind of market for the types of commodity with which it is concerned.

The essential points for us to notice are that 'goodwill' cannot arise in

¹ The strict interpretation of marginal theory will require, of course, that short-term price should be variable both in the case of a pure monopolist and in the case of a pure competitor (subject to demand and/or cost curves not behaving in a very peculiar manner), but discussions have shown me that many economists tend to regard a relative stability of prices as favouring a presumption of the existence of 'monopolies'.

such a market; there is no reason for dealing with one trader rather than with another. The essential function of the dealer is to quote a price at which he will sell to any comer and, similarly, one at which he will buy. In the short run the supply coming on to such a market is a dealers' supply and they will, by their bargaining with one another, fix prices so as to get the highest price which will leave them only with the stocks which they consider appropriate in the light of their knowledge—and judgement—of the market. Market price at any one time will consequently be dominated by short-term considerations, and costs of production will affect price only when they cause changes in supply to occur, or to be forecast by the traders.

That such a market is essentially competitive I do not dispute. The mischief is that all its characteristics have come to be taken as the essence of competition in any market—both by economists and by intelligent laymen whose thinking has been greatly influenced by elementary expositions of the way it works. For this is the 'perfectly competitive market' which is so readily explicable by diagrams of demand and supply. I shall argue that a manufacturing market, *however competitive*, will not work that way, and that, consequently, a market price which is the resultant of the balance between short-run demand and supply is not to be taken as the touchstone for a competitive manufacturing market.

What, then, is the essence of competition? As I have urged elsewhere, it is simply that *no seller can get a price which is higher than would be taken by any other potential seller of his type of product*. That is obviously true for the kind of market that we have just been discussing; it is no less true for the normal markets of manufacturing industry. This should certainly be admitted for the bulk of manufacturing industry whose products are sold immediately to other businesses (manufacturers or traders), but it is not the normal concept in modern economic thought, where demand is treated as if it were entirely a matter of consumer demands, and the latter are analysed on assumptions which rule out such competition. Further, although the older economists would have accepted it, their view of competition in manufacturing industry has been rejected in the discussion of modern problems, because their theories described manufacturing markets as if they were in all respects similar to the commodity markets discussed earlier. In fact, the principal errors in the modern theories of business behaviour have arisen chiefly in the course of attempts to correct this particular mistake—but in my view the modern theory has been much more misleading in its practical implications.

Leaving the bulk of manufacturing on one side, then, there remains the question of manufactured consumers' goods sold to the consumer at prices fixed by the manufacturer, whether directly or indirectly through

independent distributors. These are the cases raised immediately by this paper. We shall see that the general position is very similar for these commodities, but a little more argument will be required to establish it. Meanwhile, I am dealing only with the question how far fixity or conventionality of prices, taken by itself, is a sign of the absence or weakness of competition. First, an attempt must be made to explain briefly why the prices of manufactured goods, however keen the competition with which they are produced, will not be flexible in their response to short-period changes in trading conditions, as is the case with primary commodities.

3. The inflexibility of manufactured goods' prices

Quite apart from branded products, whose prices are 'fixed', it is characteristic of manufactured products in general that their prices tend to be inflexible, as compared with the primary commodities from whose markets we derive many of our ideas about competition. Since this results from the way competition works both in manufacture and retailing, this difference between the two types of markets would persist, no matter how much competition increased in the selling of manufactured products. To explain why this is so we must go a little way into the theory of manufacturing prices.¹

From some points of view it is convenient to recognize that manufactured products fall into two classes, according to their ultimate use: those used by other businesses and those which minister to the wants of personal consumers. (Some goods, of course, would appear in both lists, e.g. motor-cars.) In the case of consumers' goods, we should formally distinguish three price levels: (1) that at which the manufacturer sells his products; (2) that at which they are sold by a wholesaler (where they pass through this stage of distribution); and (3) that at which the retailer sells them.

For the problems with which we are now concerned we need consider only the first and third of these price levels. Further, we shall not miss out a large proportion of the output of this country if we ignore the cases where a manufacturer sells directly to the consumer. That being conceded, we do not need to distinguish the two classes of product at the stage when the manufacturer sells them—it being remembered, once again, that we are going to discuss branded consumers' goods separately. (Retail prices, however, will have to be considered first, before we can take up this deferred question.)

(a) *Manufacturers' prices*

The price which a manufacturer gets for his product, since it will be sold to another business man, cannot be higher than his customer would have

¹ The theory has been stated at greater length in my book, *Manufacturing Business*; in consequence no more detail is given than is required for the present argument.

to pay for an identical product from another manufacturer. The rule of competition is, thus, the same here as in the primary traders' markets, but it does not result in the same short-term flexibility of prices. A manufacturer has to look forward when deciding his price and take a long-run view:

(1) He will have to employ machinery, plant, and buildings which will last for a considerable time. In every line of industry in this country the prices which a manufacturer gets will not allow him to replace these until a number of years have elapsed—equally, of course, these fixed assets of his will give useful service for a correspondingly long period.

(2) Demand conditions work very strongly in the same direction. A manufacturer will lose his customers in the end if his price is too high; he adds to them only by the relatively slow process of acquiring 'goodwill', which is the customers' preference for dealing with him, provided that his price is not out of line with that which would be charged by his potential competitors. Once lost, the goodwill of a customer is not easily regained.

(3) When he is considering producing a particular product, given its specification and the methods by which he contemplates producing it, a manufacturer will be able to calculate only the average direct cost to him.¹ This average direct cost per unit is stable over a wide range of output for an established business. The difference between it and price is the gross profit margin, and that must be sufficient in the long run to cover average overhead or indirect costs if the producer is to survive; it must seem likely not only to do this but also to yield him a reasonable net profit, if he is to start producing a particular product.

(4) The competition in a market limits the price which can be obtained for a particular sort of product, and in a settled market an established business will, therefore, come to estimate price on the basis of a definite gross profit margin for a given class of product. Given the wages and efficiency of labour, the prices of materials, and the methods of production, price will not tend to vary with changes in the sales which a particular business manages to make.

A business will not put up its prices merely because there is a heavy demand for its products. The increase in demand will be met in the first instance by drawing on stocks, until output can be stepped up. If the business were to raise price it would make its product more attractive to a competitor, in accordance with (3) above.² Its competitors, or potential

¹ Direct costs are those which vary directly in total with output (i.e. their *average* remains constant in given conditions). They consist mainly of the wages of process labour and the cost of materials used in the product.

² It will be noted that the goodwill factor makes traders in manufactured goods perform the stock-carrying functions which dealers in primary markets are induced to perform by the short-term variability of their prices.

competitors, may well have spare capacity and it will, accordingly, be attractive to add to their output; not only will they gain the possible long-run goodwill of their new customers but, in time, such an expansion of output may mean lower costs and enable them further to strengthen their position in the market. Even if the increased demand occurs at a time of general pressure of demand affecting all existing businesses, it does not take long, in normal times, for new capacity to be installed in most lines of industry, and, if the level of gross profit looks attractive at such a time, the market will be attractive to quite new enterprises.¹

Equally, a business will not reduce price below its normal cost level just because demand is slack. If it does so, the consequence must be to cause its competitors to lower their prices and, in a time of falling or low demand such as is contemplated, this general reduction in price will not usually bring much extra sales. It will, therefore, merely diminish the profits, or increase the losses, which are being made. Nevertheless, it must be noted that at such times price-cutting may occur out of the desperation of weak businesses which cannot hope to cover the costs which they have to pay out, and snatch desperately at this last remedy. Price-cutting of this kind cannot be a normal feature and tends to correct itself by the elimination of the weak businesses, the normal gross profit margin being restored in better times.

(5) If, however, its costs fall, due to technical change or to reorganization following upon expansion, an established business in a settled industry will lower its price. It is in this way that the prices in such an industry tend to be settled by the most efficient firm. To avoid misunderstanding, it should be noted that the identity of the most efficient firm varies from time to time. It is one of the virtues of competitive activity that it provides a continual stimulus to businesses to improve their efficiency and, in the process, industrial leadership often changes its address.

(6) Of course, it follows from the above that prices will alter if there is a general change in the cost position of an industry due to rises in the wages of labour, &c., and in the prices of materials. These tend to change with changes in general business activity which affect the strength of demand in these 'primary' markets. Prices in manufacture will not, however, as

¹ It cannot be too often stressed that it is misleading to think of such competition as coming only from brand-new businesses. Factors which I have analysed elsewhere are making it increasingly difficult for such businesses, and in established lines of industry the level of available profits, even at the best of times, may not give much help to the genuinely small new business. But, in fact, businesses established already, frequently in rather remote lines of industry, are effective sources of competition of the kind contemplated. The professional reader should understand that I am not thinking merely of 'cross-elasticities of demand'. The important point is the widespread possession of sufficient technical 'know-how' to make good guesses at the possibilities in disparate lines of manufacture.

will have been seen, rise or fall just because of temporary strength or weakness of demand in the market for the product.

It is in this way that the economics of manufacture cause its prices to be relatively less flexible than those for primary commodities. Competition tends to establish relatively stable prices, given the technical and other fundamental circumstances of the industry. It will be true that the easier it is for a business to enter the production of a particular commodity (this is very much a matter of the size of capital required for economical production in comparison with the risks involved) and the wider the field from which such potential competition can come, the lower will be the gross profit margins, and, more important, the lower will be the net profit margins, that existing businesses will be able to obtain at prevailing prices. As a matter of experience, in established industries neither prices nor gross margins¹ will in themselves offer much attraction to new business. That, accordingly, tends to come in only at times when high pressure of demand makes it seem likely that they will be able to make a living at about the *existing* prices.

It is worth stressing that, already, existing competition holds prices and profits down, but that the competitiveness both of manufacturing and of distributive industry can be increased by social action. The theories of business behaviour which have become accepted during the last 20 years have made the effectiveness of such social action appear extremely doubtful, since they stressed the possibility of increased competition being frustrated by increased profits at smaller outputs (due to use of 'monopoly' powers, thought to be a characteristic of business economics). This pessimistic conclusion seems to me to be a consequence of errors in the assumptions on which the theories were constructed. The older theory of pure or perfect competition has served economics well by providing a manageable abstract view of the pricing system as a whole. It has, however, led to the consolidation of presuppositions as to the nature of industrial competition in an 'ideal' state, which are misleading when we study industry in practice. Equally, the correction of the assumptions of perfect competition in order to take account of certain features of the real world has inevitably led to mistaken views of their social implications.

The argument so far has sought to establish that the relative stability of manufactured prices, and their comparative equality as between different manufacturers, is no sign of the absence of competition—that, in fact, the latter results directly from the fact of competition, and the former

¹ A technical point: the 'large group' solution of Chamberlin, of course, makes competing businesses have only reasonable *net* margins, but the excessively small scale on which his businesses operate would, on my analysis, increase the gross margin, in terms of which new competitors will be attracted.

from the pricing rules which the nature of manufacturing competition tends to establish in a settled industry in normal times.

Cartels. Before passing on, however, we cannot overlook the fact that business men have been known not to leave this equilibrium of market price to chance and that there have been cases where they have got together and tried to settle agreed prices! Such attempts are especially liable to occur when a severe short-run cutting of price has forced it down substantially below the level of normal costs of production, even for efficient businesses. The fact that, as I have argued elsewhere, such abnormally low levels of price have only a dubious social value is beside the point that we are discussing. The relevant consideration is that, even when this happens, the price that the 'cartel' will succeed in obtaining must depend upon the considerations that we have just been discussing.

It is true that the agreed identity of price in a cartel arises explicitly from attempts to limit competition, but the participating businesses will still have to reckon with potential competition from outside, and experience shows that such agreements will not have a stable basis unless the price is genuinely held down to a level which is justified by costs to reasonably efficient businesses. The agreement will otherwise be vulnerable to competition from new businesses, and to subsequent instability.

These considerations account for the fact that, in my experience, when such cartels persist, their prices come to be determined by the efficient firm, which exerts a continuous downward pressure on price. It is in its interest to do this rather than, as usually thought, to agree to a price which will bolster up relatively inefficient businesses and offer continuous invitation to new business.¹

If the entry of new business is especially difficult, it may well happen that, even though prices are determined by costs plus only a fair allowance for profit, the fact of the agreement removes a spur to increased efficiency, and costs remain higher than they would otherwise be. There will be a limit to this, as, sooner or later, the industry will become attractive to new entrants on account of the increasing attraction of the established price in the face of technical possibilities.

Once a new business comes in for such a reason, the situation alters; there are numerous cases of such a vigorous new firm, even whilst it remains outside the cartel, becoming in effect the regulator of the latter's price policy. Even granted this view of cartels, there is still a strong social interest against them—as permanent features. Where, as is true in some cases, special circumstances make them desirable, any agreements should be subject to the State's authority and there should be some machinery

¹ For an interesting account of the way this has actually happened in the aluminium industry, see Mr. Louis Marlio's *The Aluminium Cartel*.

for governmental oversight of the way in which prices are fixed. The kind of arrangement which has been made for steel in this country provides an example.¹

All that these paragraphs on the subject have been concerned to point out is that price-fixing agreements are not the reason for the relative stability of manufacturing prices encountered in normal times—and the apparent scope for such agreements that is afforded by the times through which we have been passing would not normally be offered, and would be removed by a return to more normal relations between supply and demand (i.e. by the ending of the sellers' market induced by war-time regulation and by post-war scarcities).

Finally, I would stress that the most effective counter to private monopoly is not price control. That has always to proceed on the basis of the costs of the manufacturers who are already in the industry; and it is always difficult for an official price-controlling body to set such a level of price as to threaten the disappearance of a proportion of the existing businesses—a situation which frequently arises under the stress of the normal determination of prices. The way out is to increase the possibility of competition—e.g. by making it easier for businesses to get capital, by making illegal any agreements to drive out competitors by unfair means or to restrict channels of trade, and perhaps, above all, by not protecting home industry by high tariff walls, but, if tariffs exist and cannot be swept away at once, by adopting a policy of continuously squeezing the protected industries through a steady and foreknown reduction in tariffs. The point to be remembered is that, even with cartels, the situation is always controlled by the degree of potential competition, and *that* can be increased by social action—never, I think, by State regulation of the kind to which we tend to fly nowadays.

Pricing in abnormal circumstances. Before passing on to consider retail prices, there is one other matter which should be discussed. Market prices have been referred to as tending to cover normal costs of production in the long run. That does not mean that they will normally cover the costs of especially inefficient businesses. Further, it does not mean that they will cover the average costs even of a normally efficient business at all times.

It will be normal for market price to yield very low profits and even losses, in slumps, whilst yielding relatively higher profits in booms. In the latter conditions, of course, even very inefficient businesses may make profits, but that will be because of the increased volume of sales, not because of an upward shift in the basis of price determination. In fact,

¹ See Mr. R. M. Shone's paper to the British Association, 'Planning and Competition', *Monthly Statistical Bulletin of the British Iron and Steel Federation*, August 1949.

prices in manufacturing industry tend to remain somewhat higher in slumps and lower in booms than would happen if the market were a pure dealers' market of the kind that was previously described.

Of course, if there should be long-run conditions of great scarcity, and if for some reasons it should be impossible for businesses to add to their productive capacity, then the weaker businesses will find that they can get a price which will, with impunity, yield them a better profit. This should be regarded as a rare situation which normally occurs only in war or siege conditions, but over-full employment, for whatever reason, might produce it. Even when it does occur, the better established businesses will do their best to maintain their usual price policy—putting up prices only in accordance with rises in basic costs, and rationing not by price but by such means as lengthening delivery dates. It is because they understand such a policy as normal wisdom that such businesses usually are strong supporters of government price control in war-time. Further, it is because businesses estimate their prices in the way that I have described that it is natural for government price control in these conditions to proceed in terms of allowed gross profit margins. Equally, under such price control, it is usually desirable to keep as much capacity in production as possible. For that reason the more efficient businesses will probably find that prices are fixed at a level higher than they would fix on their own. Sentiments of fair play in such times tend to make all businesses adhere to the controlled prices.

(b) Retail prices

A retailer is more than the 'final link in the chain of distribution' of manufactured consumers' goods. If he is to remain in business at all, that is the least he can be—a mere agent, getting his customer what he asks for from manufacturer or from wholesaler. But fully developed retailing involves a much more complex set of activities and can take a great variety of forms, even in one trade; and the variety increases, the larger the population density of the area that we are considering. In general, all forms of retailing provide services other than just the getting of goods for customers, and the latter ordinarily expect, and pay for, much more than that.

The most obvious of these additional services is that of carrying stocks. This economizes the time of the shopper; it also widens his range of choice—both in any particular shop and as between shops. When we walk into a shop we expect to be served quickly with our choice of commodities for our regular needs, from stocks which are already available in the shop. Equally, for needs which arise less frequently, we expect our choice to be helped by the stocks which are present in the shops and the advice of the

shopkeepers who carry them. In addition, varying degrees of credit and delivery services have come to be provided.

It is, of course, easy to make play with the irrationality of the (other) consumer, and to attack the system as inefficient which offers such a variety of services, from the little general store or grocer 'just around the corner' to the chain store or departmental store or the specialist shop such as the stamp dealer of the largest towns. A naïve view, taking the retailer's service as just passing the goods over the counter, must lead one to despair of customers who manifestly do not choose merely to have that service at the lowest price possible. Looked at from this angle, it is very easy to measure the costs of this variety, less easy to credit any value to the variety itself. Such attacks both overlook the services which are rendered alongside the actual passing of the commodity to the consumer, and make insufficient allowance for the fact that the variety of the service offered is one of the factors which develop consumer rationality; one cannot develop reason without choice.

More important, perhaps, such attacks overlook the way in which retail competition will enforce its own rationalization. In retailing, as in manufacturing, economics, the effects of competition may conveniently be analysed in terms of gross profit. A retailer's gross profit is the difference between his turnover—the receipts from his sales—and the cost to him of the commodities which he has sold. In order to survive, once he is in business, he must be able at least to cover his costs from this fund. For him to decide to start in business he must think that he has a sufficient chance to have enough left, after meeting his costs, to give him a satisfactory reward for his own labour and for the capital which he employs.

The price of a commodity as sold by a retailer thus equals its cost to him, plus the gross profit margin on it. On many articles, where the terms of sale are determined by the manufacturer, this is not within the discretion of the retailer, who simply has to decide whether he will stock and sell the commodity on the terms offered him. Price-fixing of this sort will be discussed later. Apart from these cases the retailer is formally free to determine his gross margin for himself and thus to fix his own price. He will not necessarily place the same margin upon all that he sells. As already noted, it is usual even for specialist retailers to deal in a considerable variety of goods. Some of them will be more expensive or more troublesome to sell than others, and the retailer will tend to take a higher margin on these, for the market will be such that competition in these is normally only at a price higher relatively to their cost. Equally he may shade the margin on other articles, where he incurs relatively less expenses or finds them less troublesome to sell. It is, however, also a well-known feature of retail trade that the trader may set an especially low margin on

commodities which will attract his customers' attention, his extra trade in these being used to strengthen his goodwill generally, and thus to increase his sales of other goods. Such commodities are often called 'loss-leaders', because of the relative loss which may be made on these magnets for custom. Loss-leaders are, however, important only for articles which are well known and which generally have a definite price—and, in fact, they are especially liable to be articles whose general price is fixed by manufacturers. For the purpose of this paper it will be convenient to ignore these aberrations and to look only at the average gross profit margin—imagining, if you like, that our retailer sells only one line of goods.

In fact, when we are studying any particular shop, we shall find that the trader has a definite price policy for any particular type of article, setting a given proportionate gross profit margin upon it. Frequently the majority of the articles in which he trades will bear the same margin—i.e. their prices will be in the same relation to the cost of them to him. Indeed, in any given area we shall often find that retailers of a particular kind of commodity employ the same gross margin in their mark-up. This pricing practice of the retailer is often referred to in terms of 'conventional retail margins'.

It is true that the reason for this way of fixing retail prices must be a matter of historical conjecture, but one can see that the proportionate margin is an easy way of translating a price policy into practice. The retailer normally has to think in terms of a large number of articles and must have some rule-of-thumb for deciding his policy on a new article within his class of trade. The proportionate margin does rough justice, and makes sense, in so far as the more expensive articles of a given type cost more to sell or involve more service or are sold relatively less frequently.

Why the margin should have come to be determined at such-and-such a figure, it is, however, impossible to say. The point that we have to remember is that, given the margins, the development of competition in retailing will enforce a rational basis to them, in terms of the service which the retailer has to provide. The exponents of 'monopolistic competition', however, would probably grant that profit margins are not excessive, but would argue that costs are higher than they need be, because of excessive ancillary services, and that the consumer might prefer to have less service and a lower price but has not the choice. The flaw in this argument is in this last clause—the consumer *has* the choice of many different kinds of retailing, including the cash-and-carry multiple store, at lower prices. If he chooses to go to a more expensive type of retailer it is because he thinks the extra service worth the extra cost, and it will be a rational choice. In any area, and in any line of business, the retailers should be seen as offering their customers both their commodities and the associated

services which go with them. It does not follow that the retail prices even of very similar goods will have to be the same, for very different services may be provided by different retailers, and, where the value of the commodity can be greatly enhanced by such services, as with footwear, we must not be surprised to find that prices differ substantially even for similar articles.¹

What is true is that all these retailers will be competing for the custom of the consumers in their area—and may, of course, set out especially to cater for particular sections of this broad market. It is equally true that customers are not so quickly sensitive to differences in price or in the value of service as would be a business-man customer who was going subsequently to use the commodity for business purposes. But it makes most sense of the history of particular retailers to suppose that there is fairly sensitive competition in the rather longer run. One consideration which tells in this direction is that it only needs a fair proportion of consumers to be sensitive to such differences in the values which they are offered for an equally substantial proportion of turnover to be dependent upon these considerations; a retailer who offered substantially better terms would thus find a marked growth in his trade.² This leads to the further consideration that the fact of such customers is of even greater importance than their probable proportion would suggest. As we must all know from our own experience, such discriminating buyers have their effect upon less sensitive persons. It seems wrong, therefore, to analyse retail trade as if it were so irrational an affair as it has become fashionable for many economists to make it appear, certainly not when we are making statements about retail trade in general.³ It does not make sense, when we study

¹ In fact, of course, the commodities to which the higher margins are attached are usually of a somewhat higher quality.

² I am indebted to Mr. Ward-Perkins for this point, which is based upon a criticism which he made to me of Chamberlinian theory.

³ This reservation is made because it must be admitted that there are some goods which apparently are subject to irrationalities—where the appeal of the commodity is on ‘snob’ grounds, consumers buying them because they are high priced and, therefore, suitable for ostentatious expenditure. I do not think these cases are so important—they are not to be confused with the purchase of better-priced articles, where experience has taught the customer that such price differences represent quality differences. To come back to the former case: even so, it does not follow that prices will not have normal relations to costs; e.g. I remember one business producing a consumers’ good *de haute luxe*, where the business man believed that it was bad for his trade to make price reductions—or rather, to advertise them. Nevertheless, any substantial fall in his costs (he was a manufacturer-retailer) was followed by a corresponding cut in price, which he did not shout about; and any minor but persistent fall in costs was followed by an improvement in quality so that the cost of the article went up correspondingly. The reason for this was that too great a gap between costs and prices would attract new entrants into this particular market. Potential competition thus made this business offer normal quality for the money. It is, of course, a question of fact how quickly such competition would arise. One can say only that experience makes established business men attempt, through their price policy, to prevent it arising at all. Recent theory seems to me too prone to assume both serious imperfection of knowledge and a readiness on the part of business men to rely on it.

actual retail trades, to imagine the goodwill of a retailer as allowing him to get a higher price indefinitely irrespective of the value of the service which he provides—i.e. of the costs of his commodities.

When we are, as in this part of the paper, thinking about retailing as a whole, we can simplify the picture considerably by analysing the retailers in one line of business *as if they were* selling identical commodities with identical services attached; we thus get a theoretical model whose characteristics can be used to throw some light upon the rationale of the more confused real world. On the assumptions that we have made, each retailer will find that the price which he can get will be determined in the long run by the price at which new businesses would try to get into his market, and competition will thus control the gross profit margin which he can set in the long run. Of course an established retailer will have built up goodwill, and will have customers who will prefer to deal with him, provided his price is right and they can do no better elsewhere. If he charges a higher price, then he will lose customers and their goodwill in the long run. If he cuts price below this level, it will not really pay, because other business men will cut theirs to counter any inroads that he makes on their markets. Thus business men's short-term policy will reflect this situation and gross profit margins will be determined by long-run competition and will be stable except in periods of price-cutting due to temporary distress of the kind which we analysed for manufacture.

We have already mentioned that, in any one line of business, retailers will be found offering many different kinds and degrees of service. How does this normal-cost rationale work out there? This will be understood in terms of a realistic example: the development of retailing, partly under the influence of the increasing concentration of our urban population, has led to the development of retail chain stores, which get substantial buying economies by their size, and also selling economies (so far as the actual physical transaction is concerned) by locating themselves at suitable centres of population. They therefore offer cheaper goods and by this means induce customers to come to them from the suburbs. What is the effect of this competition? The smaller, dearer businesses on the periphery must offer more services in order to justify their higher gross profit margin, otherwise the reduction in their turnover will drive them out of business.

It is in this way that competition in retail trade ultimately determines the value which the consumer gets for his money. There is one thing more that must be said about retail trade: where there are no artificial restrictions, it is much the most competitive line of industry. That is because it is easily entered, many persons have sufficient knowledge to be able to make fair estimates of its profitability, and only moderate

capital is required. (It should be said in passing that many factors have begun to make this competition potentially less, e.g. town-planning restrictions upon the location and numbers of shops, to mention one. The modern passion for regulation has led to suggestions for further 'orderliness' by the regulation of entry and by the use of clever methods for penalizing 'inefficient' (i.e. small) retailers through tax devices. These should be resisted.) In consequence, the profits available in retailing have been fairly tightly held down; it has been the economic 'frontier' of our country for a long period—to be one's own boss is a good spur to enterprise and retailing has been one of the easiest fields for such would-be new enterprise. In consequence of this we have had our retailing done very cheaply.

One sign of this is the ease with which the small one-man shops, which are still important, can be attacked as inefficient, because so many make losses (especially if a fair value is put upon the market value of the labour of the man and/or his wife) and there is considerable mortality. It is difficult to see why a greater return should be offered, and I do not know why it has become so fashionable in some quarters to attack this part of the capitalist system where the consumer does get a great deal, if not for nothing, then for what the critics regard as a pittance. There would be a lot to be said for trying to increase the ease with which new business could set up in other industries and increase the strength of this 'inefficiency' there!

The main conclusion to carry forward from this section is that in retailing, as in manufacture, prices will be controlled by competition and that the levels of normal cost will decide the size of the gross profit margin which is available to a business. Before passing on, it should be noted that the omission of reference to the effects of advertising is deliberate—this is dealt with in the last section of this paper. First, we have to discuss the explanation of conventional prices and the pros and cons of price fixing of branded goods.

4. Conventional prices

In my *Manufacturing Business* I have already explained in some detail how conventional prices come about, and so the matter can be summarized here. Conventional prices arise for some consumers' goods at the stage when they are actually sold to consumers. There is first the case of semi-durable consumers' goods which are in wide demand, and which, therefore, have to be supplied in a considerable range of qualities. Examples are boots and shoes (not of the 'extreme fashion' kind), ties, or towels, sold through the ordinary mass channels of distribution. To take the first-named, the general demand in this country, before the war, took men's

shoes at prices which covered as wide a range as from 6s. 11d. to 12s. 11d. or 16s. 11d. In such a case there is, obviously, almost an infinitude of opportunity for quality variation and, if the market worked at random, the consumer would be faced with a literally bewildering variety of qualities of footwear at a corresponding variety of prices.

It is, however, easy to see why things have not worked out that way. Obviously any one shop would find that it paid it to offer shoes at clearly differentiated prices, suiting definite layers of purse or taste. This would enable it to get the maximum buying and stockholding economies for a given turnover; it would also be found that customers liked it, since the choice was clearer and it was also easier to see something of the difference in quality which was being offered for a given difference in price. The chain stores would naturally have the same policy over their areas. The development of these forms of retailing has been responsible for a considerable strengthening in the habit of shop-window shopping, whereby a consumer collects information about 'the state of the market' at times when no purchase is contemplated, and is enabled to make rapidly a final survey of the situation before he actually enters one or more shops to examine matters more closely. It would be found that to pick upon 'fancy' prices was not of much use, that it 'bothered customers'; this means that subject to minor aberrations, due to beliefs that people did or did not like prices at even amounts but at a penny less or threepence on, the shops in a given area would offer their shoes at the same 'price tickets'.

It will be seen that the development of these conventional price levels has made the market *more* competitive rather than less; they facilitate the more exact comparison of what is being offered and enforce therefore a much closer competition in quality of article or service than would be possible otherwise. The exact points at which different qualities were offered within the price range has no doubt been arrived at as a matter of experience, but it can be seen as corresponding to levels of demand which are largely dependent upon income levels—for such types of consumers' goods, those consumers whose incomes fall within a given range will have a typical price up to which they are prepared to 'go'. This rightness of price from the point of view of monetary convenience and of considerations on the income side has been confirmed by modern marketing research. It does not mean that the consumer is indifferent to what he gets for the money, but that it suits him to allocate a certain sum for a particular purpose, and, generally, to deal in particular units of money—his pre-occupation then being to see that he gets the best he can for his money.

It will now be understood why conventional prices in the strict sense emerge—why we find certain articles always being sold at particular prices; a penny for normal boxes of matches, sixpence for the smallest

tubes of popular brands of toothpaste, and so on. (The quoting of pre-war prices and customs is deliberate.) In some cases it has been found that a shop offering better value for some fancy price lower than that which has become conventionally established gets less sales than if it puts its price up; and this is a favourite instance of the behaviour of the irrational consumer. But, as already seen, it is reasonable that conventional prices should exist and, to take up again the example in the last sentence, a shop which adopts the 'usual' level of price will need to offer as good a quality as the next one if it is to get and maintain the increased sales, and it will do better in the long run if it can improve its quality.

Meanwhile, perhaps it will be accepted that, for the classes of commodities where experience does give information as to quality, conventional prices do *not* imply the absence of competition. If the costs of manufacturing and selling a particular article sold at such a price fall, then quality will have to be increased. Otherwise, the market will be invaded by new entrants whose competition will be attracted by the increased generosity of the gross profit margins. In this case, then, shops will supply superior goods or more services.

Equally, if costs rise permanently, specifications and qualities will have to be cut or services reduced. If costs rise high enough (which will usually be due to an inflation and hence to a rise in money levels of income), then the levels of conventional prices will be raised (which will suit the new income conditions) and quality will not be cut so drastically as would otherwise have to happen.

As a matter of fact, we also find continuous changes in quality in response to temporary changes in costs (e.g. over the trade cycle) for many goods subject to conventional prices. Some goods, however, such as proprietary goods of rigid description, cannot change in this manner.¹ In that case, unless costs fall very substantially, so that a change in price does become feasible, the price will be lowered indirectly—e.g. by the occasional offering of two articles for the price of one in special selling campaigns, the giving of tooth mugs away with a tube of toothpaste, &c., or putting more into selling costs, so that the consumer is offered the greater convenience of finding the article much more widely stocked. (This is a service to him, for, as Professor Lewis has observed, the ideal to the consumer would be to have a shop in his home; it follows that a more widespread system of stocks is at least some gain.)

The kind of indirect cutting of prices to which we have just been referring seems especially wicked if we judge on the basis of a notion of prices which can be fixed at any level, when we may think that a consumer should

¹ For example, it would be impossible to produce many commodities economically if continual changes had to be made in packaging, cartons, &c.

always be given a direct price cut. But granted the consumers' monetary preferences and conveniences, the more flexible price policy which might naïvely be demanded might well tend rather to upset the market than to improve it. This question of upsetting the market links on with the question of advertising and selling costs generally, to which we shall return later. Meanwhile it should be said that many of the consumers' goods of the types to which we have been referring, and which are the subject of the kinds of attack which this paper is rebutting, now cost a lot less than they used to, and are much better goods, because they are produced in a modern mass-production fashion. That, in turn, has been possible just because of the orderly development of retail markets on the basis of the preferences and the conveniences of consumers. However, before the subject of advertising leads us on to these wider issues, there remains the question of the fixing of prices by manufacturers for their branded goods.

5. 'Branding' and the maintenance of retail prices

Although it has been much attacked, the fixing of retail prices by manufacturers and the enforcement of their policy upon retailers is not the simple monopoly practice that it is sometimes thought to be. However, before a manufacturer can enforce a retail price he will first have had to have established his 'brand'. So before we can consider the question of retail price maintenance we must discuss that of branding—the marking of an article with a trade name or mark to indicate its origin and the popularization of that mark with consumers.

Branding has become of especial importance only in comparatively recent times, the present general significance of brands and trade marks having developed alongside modern methods of manufacture and commerce. The latter have not only led to, but have also depended upon, an increased remoteness of productive processes from both consumer and retailer. The branding of consumers' goods is a natural complement of this development, as we shall see, and is, equally, tied up with advertising, which will be separately considered in the next section of this paper.

It is possible, and indeed very useful, to think of all the stages of the process of making an article and getting it into the hands of a consumer as complementary to one another when we are looking at the process as a whole. When we look at it from the point of view of an individual business, however, it is important to remember that the functions of manufacturers, wholesalers, and retailers overlap in practice, so that actual businesses are competitive even as between the stages of distribution.¹

¹ This matter has been well discussed by Professor R. G. Hawtrey in *The Economic Problem*.

Competition is a matter of the behaviour of individual businesses and not of the logical relation between industries.

For example, it is correct to think of manufacture as involving more capital for its successful operation as compared with the typical situation in retail trade; but it is wrong to stress this as a factor necessarily reducing the relative competition of the individual business when we pass over from the latter industry to the former, as though the two departments of industry were cut off by watertight bulkheads. For, in many ways, the manufacturer of consumers' goods has to reckon with competition from wholesalers and retailers—i.e. from the field where direct entry is regarded as so much easier. Equally, if we think, as people often do, of retailing as being much more imperfectly competitive than manufacture because of the local 'monopolies' of small retail shops, then, even on that view, the retailer of the simple kind that is imagined will have to reckon with direct and indirect competition from manufacturers who are usually thought of as working to finer profit margins.

It is because the whole system of manufacture and distribution forms such a network of complementary and competitive relations that it may have a social justification in terms of the satisfaction of consumers' needs—if not on the hypothetical cheapest terms possible (which is much easier to assert—or to deny—than to assess) then, at least, on *competitive* terms. In this system, what may seem a very secure quasi-monopoly, viewed narrowly, is frequently open to appreciable competition of an indirect kind. For example, the development of manufacturers' brands, on the one hand, and of chain and departmental stores on the other, may be seen to have greatly increased the competitiveness of modern industry: the one through greatly increasing the amount of standardization of product which consumers will take voluntarily, the other through increasing the degree of standardization of retail service, and both through providing in these ways cheaper or more attractive substitutes to products made or distributed under the older system. The fact that the firms developing these newer methods may be analysed as strengthening their own position by their success is beside the point, since their success is a measure of their effective competition with other businesses.

The full implications of these cross-relationships, and the significance of the practice of branding, will be seen more clearly if we take the case of what we may call the primitive manufacturer-retailer before the development of modern industry. His one business will combine in itself all the functions that modern conditions cause us to distinguish and analyse separately: he will have formal responsibility for deciding exactly what the nature of his product will be; and not only for making and selling it, but also for carrying stocks for his customers' convenience and his own,

as well as deciding just what other services he will also be ready to render for the price of his product; which latter, of course, he will formally decide for himself.

Now, all and each of these, except that of merely selling the product as little more than an agent for someone else, *may* be performed elsewhere than at the retail stage or anywhere in the system of manufacture and distribution, and it is the possibility of putting their brand on the product that enables others to take over any of these services so freely, and thus increases the flexibility of the whole system. Branding does this because it provides access to the 'goodwill' of the consumer—the custom of the consumer to come back and ask for more of what he finds satisfactory at its price.

The mere development of modern manufacturing processes made it inevitable that production should no longer be carried on in retail premises, the costs of a bought ready-made article falling so low as to compete effectively with products made on the smaller original scale. A considerable measure of standardization would also tend to be imposed because factory-made goods must go through standard processes—certainly the orders coming to any one factory would have to be relatively standardized. Further, the newer manufacturing had to be relatively more localized than retailing, and once it had become localized, well-known reasons would increase the concentration of manufacture.

These developments initially favoured trading by wholesalers as a means of cheapening the cost of goods still further; wholesalers entering into successful competition with manufacturers and retailers for the performance of their functions. They could combine the orders of their retail customers in such a way as to give larger-scale orders for any particular type of product, and would also save costs through their specialized knowledge both of the retailer's needs and of the manufacturer's specialities. In addition, some of the stock-holding functions of the retailer would pass to them, since with their larger turnover they could economize in what may be thought of as the 'second line of defence' element in stock-holding. The retailer could cut his stocks down to the minimum for day-to-day selling and rely upon the wholesaler to meet any unexpected increases in demand at fairly short notice, passing back upon him likewise some of the first effects of an unexpected decrease in trade.

Such wholesalers would be competing with one another for the favour of retailers, and with the development of competition that goodwill would be a very short-term affair liable to be cut off fairly quickly for quite small differences in price, even if these were temporary incidents. Further, however much standardization the mere development of manufacture would impose, there would still be a strong element of differentiation of

the product due to particular retailers imposing their idiosyncrasies—and in the competition of retailers, the desire to offer something a little different from others would affect both the product that they ordered as well as the services that they provided with it. The goodwill of the final consumer would be a much more stable factor; the price to him could not reflect the sensitive small changes that might occur in wholesale prices in the short period, and whilst he would tend to go back to his shop for what he had had previously, his shopkeeper was certainly not obliged to offer the same stability to the wholesale supplier.

The self-interest of the wholesaler would naturally tend, then, to make him think in terms of establishing *his* brand of the commodity and making it known to the final customer. The development of advertisement made this possible since he could inform the consumers directly about his brands and seek to attract their custom. The retailer would then find that his demand was for such-and-such a brand, and a successful sales campaign on the part of the branding-wholesaler would lead to his stocking the product and selling it for what it was. The wholesaler, however, in the long run would be able to hold his position largely because the relatively increased scale of standardization would lead to further production and stock-holding economies.

Still further developments in the scale of industry as a whole, with increases in trade and population, would similarly lead to the development of manufacturers' brands when once some manufacturers had become large enough to be able to produce economically a greater variety of their product—so that they could take on the relatively more varied market of a wholesaler—helping out their own production by buying on a wholesale basis such parts of their trade as were too small in scale for them to manufacture. They also would have as inducement the magnet of the relatively more stable retail and consumer demand. They would succeed to the extent that they were large and efficient enough to produce their product and distribute it as cheaply as could one of their rival wholesalers. Once they had done this successfully they would in fact tend to produce more cheaply than before; not only would their products be relatively more standardized but they would also have the possibility of growing larger and thus getting the benefit of any reduction in costs through so doing.

This last possibility would arise because the wholesaler would tend to disperse his orders to some extent, since he would prefer the insurance of dealing with several manufacturers—thus getting a more continuous direct knowledge of market conditions as well as having a wider area to draw on in times of difficult supply; equally, one who was purely a manufacturer would tend to have a more varied product than one who became his own wholesaler, and, where economies of scale were important, the

latter might therefore get lower costs of production. So long as he were large enough to do the wholesaling side economically he would improve his position by greater profits or by lower prices—the development of competition would, in the long run, enforce at least a measure of the latter.

Before turning on to the question of price maintenance by the proprietor of a brand it is interesting to complete the picture of the development of modern business, which we now see in full competition for the goodwill of the final consumer. The growth of urban populations has enabled the business on the retail side to compete with manufacturers and pure wholesalers in the distribution of (un- or own-) branded goods even in those lines where the economies of wholesaling and manufacture are important enough to have facilitated these earlier developments that we have been describing. The growth of the chain store has meant that some retail organizations have been large enough to become their own wholesaler and, in some cases, to concentrate sufficient trade either to manufacture for themselves or to get full economies in the price which they can command from manufacturers. This also has been helped somewhat by the development of advertising, but that is not so important here as it is for the selling of manufacturers' and wholesalers' brands.

Modern trade thus presents its complex picture of independent retailers, chain and departmental stores, manufacturers and wholesalers each providing a variety of services. The same class of product may be sold through any of these channels. Subject to the fuller consideration that we have to give the question of advertisements, the success of any one of these depends upon its efficiency in meeting the needs of the final customers. The manufacturers' brands will have to compete with those of the wholesaler, and, both, with the speciality product for which the retailer takes responsibility. If any one of them is notably cheaper than a rival method of manufacture-distribution it will drive the others out (thus the economies of mass production in soaps and toothpastes have made these a manufacturers' market). Otherwise they will each tend to specialize in that section of the market for which they are at least as efficient as the other methods of distribution.

Here we must observe that the variety of trade has some relevance to social policy in the scope that it offers for the talents of all sorts and conditions of men. Nowadays we concentrate too much upon the economies of large-scale organizations. For one thing these need large-scale talents, and these are relatively more scarce than some of the nationalization proposals would have us believe. Secondly, the costs of production and distribution are only one side of the picture—the consumer buys more than this. In other parts of the field, and for commodities where the economies of large-scale production are not already dominant, there is

plenty of room for the, perhaps mediocre, talents of the small-scale man with energy. Many of the services of retail trade in particular are such that they can best be provided by a small man who is literally minding his own business—e.g. the provision of credit facilities and the careful attention to likes and dislikes of customers, each of which will require a detailed personal knowledge and judgement. That is one reason why we should lose something if retail trade ceased to be the despair of those who see the world with a planning eye—which is easily acquired, since the kind of information which is readily available makes it relatively simple to judge the cost of everything, but much more difficult to judge its value. Profit considerations in the end lead to the relative success of more standardized methods of production and distribution of commodities where consumers' needs do not seriously differ, yet they leave room for the satisfaction of unstandard wants where sufficient people have them to make this worth while. If we increase the competitiveness of the system—which is feasible—costs will be reduced without the sacrifice of flexibility to standardization. A standard system of distribution of standard goods might certainly have very low costs but it would equally, or more, certainly have to be enforced. It is the virtue of the competitiveness of retail trade that it offers sufficient variety for the consumer to be some sort of judge in his own cause.

Within this complex, brands play a very important part, as we have seen. They enable manufacturers and wholesalers to enter into direct competition for the retail market, thus not only increasing its competitiveness but also enabling manufacture or wholesale distribution to proceed upon a larger-scale, more standardized basis, where the technical gains from this are sufficiently large. They have also played an important part in the maintenance of quality standards for products whose quality is not obvious to the eye, but has to be learned by experience. On the basis of the latter, a consumer can ask again for what pleased him, or equally, shun what disappointed him.

Price maintenance

By itself, branding does not require that the manufacturer should fix the retail price of his product. The brand may merely be a mark of origin to be associated with a certain standard of quality in the case of products whose description is subject to continual change, fashion goods, &c., and also where the industry or trade is such that the manufacturer produces a great variety of goods. Where, however, the branded products are of standardized description for fairly long periods, the manufacturer will be more or less obliged to adopt the policy of fixed retail prices and to take steps to see that they are observed in order to safeguard his sales position.

A number of causes contribute to this, but the basic position is that a standard branded product whose price is subject to arbitrary variation as between retailers will lose the goodwill both of retailers and of actual consumers, and so will not be able to maintain its position. First, there is the fact, whose recognition has caused such a change in retail trade since the latter half of the nineteenth century, that consumers prefer shops to mark their wares with fixed prices in plain figures. No one minds finding a bargain, but for their ordinary needs consumers do not like to have to *haggle*—indeed, they would have little time for it—and they therefore resent that the price they pay should depend upon the accident of temperament or of their personal position. A manufacturer by advertising and branding makes himself known as the responsible source in the case of his branded product, and, where this is described as a recognizably standard commodity, consumer sentiment—and that of retailers in general—will expect that its price should be standard and announced. It will be natural on this score for the manufacturer to fix prices. Consumers will certainly not expect, as a rule, to pay more for the same product just because they bought it at one shop rather than another. Since retail values make some sort of sense in the light of experience, consumers will be suspicious of the value that they are getting for an article whose price varies at all noticeably according to the shop that sells it. In consequence the manufacturer will lose goodwill for his product.

But why should there be a noticeable variation in the selling price? As explained earlier, retail margins will in general be determined by normal costs and they should accordingly tend to be comparable for articles which involve similar costs in distribution. That will be true for the majority of retail outlets, but branded goods are especially likely to prove an exception for outlets which are having difficulty in maintaining their position or wish to make an aggressive expansion. We referred earlier to the use of 'loss-leaders' in order to attract custom. Branded goods are especially attractive if they are of the standardized kind that we are discussing. Branded goods will have been generally advertised and tend to become recognized standards of value; to offer these at prices which will be beyond the competition of retailers who depend at all largely on such goods for their living will attract both attention and custom, leading to an increase in trade for other things than the branded goods. The retail shop using them as a loss-leader will get an expansion of trade, but the others who do not cut prices so unduly will lose trade in them. The consequence will be that they will be withdrawn from these, perhaps more normal, outlets, and the price-cutting shop will have gained its advertisement at the expense of the manufacturer of the branded product.

It should be noted that it certainly does not follow that the shops which

are especially liable to do this sort of price-cutting will be very important outlets for the kind of goods in question—otherwise they could not make the kind of reduction in price which we are contemplating. They will, in fact, be especially likely to cut prices on goods which will attract buyers' attention in the way that we have described but which are not an important part of their turnover. The effect of this type of competitive advertisement will therefore be to diminish the market for branded goods, not by providing cheaper substitutes but by saddling the manufacturer in effect with the costs of 'advertising', or rather promoting the general trade of the price-cutter at the expense of his own goodwill—and this, as we have seen, is necessary for such goods to be produced on such a large scale.

Once the manufacturer *has* fixed his price, the dangers of such price-cutting become more serious. Price-cutting on an article which has a publicly announced price will make it an even more attractive loss-leader. The manufacturer, therefore, normally makes it a matter of contractual obligation that retailers shall observe the prices that he sets.

This practice of price maintenance has, as we have already said, been seriously attacked, and was considered in the report of the Resale Price Maintenance Committee (1949). The committee concluded against interference with price-fixing as such but recommended that the government should stop certain other practices designed to increase the control of the manufacturer over his price. We shall refer to these wider issues almost immediately, but, first, it seems desirable to review the question of price-fixing by itself. The main burden of the attacks has been that it imposes monopoly control over the retail market and prevents the more efficient retailers, whose costs are lower, from competing with higher cost outlets because all have to sell the goods at the same price. There is, of course, something in the strict letter of this attack, but, looked at more closely, price maintenance need not mean higher prices for lower cost goods.

We have already made the point that competition of the loss-leader kind is especially liable to develop in the case of branded goods, and that such competition would in fact prevent branded goods from playing their important part in the process of competitive trading; also that by its nature it has little reference to costs. It is true that the sort of unfair competition that we have in mind is especially liable to come from retailers whose actual costs of trading are low. Such retailers are the large departmental stores situated in the centre of large towns, and chain stores similarly placed. We have already seen that this concentration enables them to get low costs and to attract custom for the kind of goods which it is convenient for the consumer to buy on his shopping expeditions; i.e. they get their low costs at the expense of imposing some extra costs upon the consumer by way of extra fares, the loss of the convenience of being

able to make a sudden casual purchase, and also the loss of personal services such as the smaller shops can provide. For such businesses it will be the case that they can take on trade at lower costs than can the smaller retailers, and competition tends to bring them the sort of goods in which they can best deal. It may be thought that the attractions of lower prices for branded goods would concentrate the consumer's demand on these shops, the manufacturer thus probably benefiting from increased trade. In so far as this is possible there is nothing to prevent such large-scale retailers developing their own brands at their lower prices, but, in fact, it would probably not occur. The costs involved in shopping at the low-price shop would mean that the consumer would be forced back on to the more differentiated, unbranded market, which would then be provided by his nearby retailers. Both the consumer and the manufacturer would thus lose the economies of large-scale production based on branding by the manufacturer.

It is, of course, open to these low-price shops to advertise their services and promote their sales by whatever means they can, and relatively heavy expenditure upon advertisement of one sort or another is one of their costs which counterbalance their efficiency in direct selling—which is really a logical complement of their remoteness from the consumer. I therefore see nothing against loss-leaders where those who set the price have the full responsibility for their decisions and bear the whole costs. Although such loss-leaders will be more effective if they consist of price-fixed branded goods, I do suggest that other business men are correct in thinking that this latter is unfair competition—in the sense that its social consequences, as has been argued above, are on balance negative. The consequence, then, is to reduce competition in the long run.

If, as is the case, the types of retailer that we are discussing have lower costs, that should be reflected in their *general* price policy, and they are not prevented from attracting the consumer by low prices there. There is no reason why the economies that they obtain should be concentrated upon branded goods at the expense of margins which are maintained relatively higher than they need be for other goods. Many of these retailers to whose case the critics appeal, on the grounds of low costs, are of such a size that they could well establish their own brands for many goods, and they can determine their own price policy for them. Where they are not large enough it surely means that they cannot carry the branded goods on the cut-price basis as a long-run proposition, and so that the standard branded product of the manufacturer justifies its existence.

There are, however, as the Resale Price Maintenance Committee pointed out, other practices which have grown up, which are understandable from the point of view of the manufacturer of branded goods, but whose social

value is more questionable. They all involve the standing together of such manufacturers and the imposing of sanctions upon any shop which has been found to cut prices in any line covered by such agreements. To impose the penalty that the retailer should lose the selling rights for *other* branded products seems too strong—it means that the powers of the manufacturer of any brand are bolstered up by the advantages of other branded goods and do not have to be sold and stocked simply on their own merits. I must admit that I can see the argument that failure to stand together may mean that some manufacturers will acquiesce in occasional price-cutting and get a temporary advantage over those who stand out against it.¹ If that is so, then the matter should be left to the normal tests of profitability which will adjust the matter in the long run. Freedom here will increase the competitive controls over the prices of branded products, and it seems to be desirable.

Where such manufacturers get together to impose exclusive dealing so that a particular shop may not stock any articles of the kind covered by the agreement unless they emanate from one or other of a particular group of manufacturers and are controlled by price-fixing agreements, it seems quite indefensible. On these matters, then, I am also in agreement with the report of the Resale Price Maintenance Committee to which I have referred, so far as I can see the economics of the matter. In default of clearer proof of social advantage, these ancillary practices might well be forbidden.

There is one other matter to which we should refer—the feeling behind the attack upon branded goods that they automatically give their manufacturer such a monopolistic position that he can get an unduly high price. This is, however, closely tied up with the question of the effects of advertising which has been deferred until the next section, and it does not seem very profitable to disentangle the other consideration separately. This topic will, accordingly, be reviewed later.

6. Advertising

In most of us there is a good deal of instinctive sympathy with Adam Smith's attitude to 'unproductive' labour—the labour which does not result directly in the production of physical articles which we can see, weigh or measure, and handle. So far as concerns personal services performed for us directly, at least we know that we have had them—although we may well feel that we often pay a man rather a lot just for 'knowing how', as the well-known story has it. Our natural suspicions are much stronger in the case of the services and costs involved in getting products

¹ It has been suggested to me that in some lines of trade it might be possible for retailers to remain on a price-cutting basis, taking up another brand when they were forced to drop one, and so doing what might be considerable damage to the whole trade in branded goods.

to the shop, holding them at our pleasure, and handing them over the counter. On reflection, however, we are usually prepared to agree that, even here, these services must cost something, but are very ready to believe that, if things were properly organized, these hidden services of the retailer would cost us appreciably less—which is why the term ‘middle-men’s profits’ carries such a sting.

But when it comes to advertising, it seems almost impossible to accept this as anything but a waste. This is quickly seen as the one part of the cost of a commodity for which we get nothing whatever. For we refuse to accept the pleasure that most of us get out of reading advertisements as being any justification for the cost of them in itself. This attitude of the plain man has a considerable echo in the undertones even of nineteenth-century economists. (Note Marshall’s attitude to commercial travellers, whose wages he regarded as an advertising cost.) The development of the theory of business behaviour between the wars provided a very convincing rationalization of this attitude. I have discussed this fairly fully elsewhere. Here I need only summarize the position as that, in order to reconcile certain facts about the behaviour of costs of production with the existing theory of the behaviour of an individual business, the latter was eventually analysed on the lines of a quasi-monopolist. Buyers’ preferences of an irrational kind (in so far as they would pay more for the product of the business to which they were thus sentimentally attached than the price at which they could get an identical commodity elsewhere) which were required to make the newer theories work, were adduced as the chief explanation of the differentiation of the market which they assumed. Selling costs, of which the leading type was advertising, were produced as the chief explanation of this behaviour of customers and the acceptance of it by producers.

So far as the mass of manufacturing industry is concerned, advertising is not very important, selling costs of other kinds involve services to the businesses who are the direct customers of these typical manufacturers, and the theory demonstrably breaks down; with it goes the chief basis of the theory of business behaviour which was involved, and the way is clear for a theory which takes more explicit account of the method by which such businesses do, in fact, determine their prices. That method—basing price upon normal average costs—is also applied by other types of business: by those manufacturers selling branded consumers’ goods and by retail shops. The traditional theory involved is, accordingly, suspect here as well. But the emphasis which it places upon the importance of the persuasive function of advertising remains. In the rest of this section we shall examine what conclusions can be reached about the function and effects of advertising.

It must first be granted that the purpose of advertising is to attract consumers to the commodities which are advertised and persuade them to purchase them in preference to other articles of the same class and to other articles in general. But is it correct to regard advertising as a cost to which there is no limit? other than that set by a firm's (assumed) calculation of marginal selling costs and marginal revenue—a cost which, in this sense, would be automatically covered by price no matter how slight its real services, the consumer being persuaded to value them accordingly.

Let us clear out of the way one class of goods whose attractions lie entirely in the mind of the consumer—such things as lucky charms. Here it is true that the persuasive function of advertising *may* enable these goods to sell for a price which will cover the advertising cost, no matter to what level that rises; it *may* be true that advertising can so successfully play upon the fears and hopes of the consumer that he will think that the object which satisfies these wants, themselves partly created by the advertising itself, is worth whatever price will cover the costs of the advertisement. We can dismiss this case because it is relatively unimportant so far as normal industry is concerned. The remedy for it is not so much to discourage advertising but, through education, to help the consumer to know the truth about these matters—and generally to work for a society in which the ordinary man is not subject to the basic fears from which these habits spring. There remains the large class of branded consumers' goods and other objects of advertisement in which the consumer does get something else for his money beside the product of advertising—he may be thought to get more or less, just as the costs of advertising form varying proportions of retail prices. In all cases advertising exercises its persuasive function, which may, perhaps, reach its maximum in the case of certain patent medicines and other nostrums which may border on the lucky-charm type of case, so far as their intrinsic value is concerned.

As has been indicated earlier, the function of advertising is to convey information in order to enable our modern large-scale manufacturing and distributive system to overcome its relative distance from the consumer who, in the end, decides what will be and will not be sold. The small shop in the middle of its customers does not need to advertise in order to inform them (or to attract them); it is, however, a necessity for the larger central shops of a town and for manufacturers and wholesalers of branded goods. Without it they could not obtain the consumer-goodwill that they need to survive; and it is the development of these forms of competition in retail trade that has enabled consumers to obtain at lower prices the goods and services which are more efficiently provided by large-scale trading. From this point of view advertising is a cost which has to be covered if

the economic system is to get the benefit of these newer developments where they are most effective. The reservation at the end of the last sentence is significant. It is not correct to go to the other extreme, refer to the low costs of these forms of distribution, and then urge the sweeping away of the small-scale inefficient retailer in order to be able to concentrate, by a measure of compulsory rationalization, the demand of consumers upon the lower cost outlets. They may have lower costs up to the point of sale, but in the transference from the 'less efficient' forms of distribution the consumer will incur some costs which do not come into the reckoning, e.g. extra transport, and the giving up of the special services which the other forms provide just because they are small-scale. Free competition in retail trade enables the consumer to choose how far he will go in order to get reduced costs, and the extra costs of advertising are the price that we have to pay for this flexibility of the system. It is only too usual to analyse business life as though all consumers were standardized and as though all business operations could be concentrated. In fact this can be done only at the expense of inefficiency in other parts of the system; the dispersion of businesses must increase the nearer we get to the consumer.

What decides the amount of advertising expenditure that, say, a branded product has to carry? In the case of the majority of consumer goods, I would suggest that experience, both his own and that related by others, does enable the consumer to make some judgement of the relative value to himself of different goods and services sold at various prices. In that case the price of the advertised good cannot, in the long run, be higher than the price of a competing article sold through a channel carrying less advertising, allowance being made for differences in quality and in associated services supplied with it. Advertising will, therefore, justify itself in the long run only if, on balance, it does lead to economies, somewhere in the system, which are sufficient to pay for it. In itself it is a necessary cost of such economies being realized in a society which retains any degree of consumer freedom.

This is even true in the very suspect field of proprietary medicines—by which is *not* meant quack nostrums, but the branded preparations of recognized medical dispensers. Let us first take the case of the standard drugs advertised not to consumers but to doctors. The alternative to their being made by the manufacturer will be their compounding by the local chemist. This is certainly a field where economies of large-scale production and distribution are important; at the same time the advertising costs are not very important and the advertisement is directed at skilled persons; it therefore seems to me likely that, on balance, the prohibition of the use of proprietary brands of such medicines (e.g. as a provision under the

National Health Service) must in the long run be expected to lead to a rise in their costs--unless they continue to be bought ready-made from the former suppliers, in which case we cannot expect much change in their prices.

There remains the case of domestic medicines such as aspirin. Aspirin is not just aspirin: like any other consumers' good it is an article available in certain places and at certain prices. Now, such a commodity is especially liable to be required to meet sudden needs and emergencies of consumers, and will therefore require to be stocked fairly widely and to be sold in relatively small packages. The heavily advertised brands of aspirin meet these requirements. The advertisement means that consumers will accept them wherever they find them. (This is not so much a case of persuasion as a consequence of the belief that 'advertised goods are good goods' to which we shall return in a moment.) Retailers such as the corner grocers will therefore be willing to stock them, and advertising thus enables a genuine consumer demand to be met. But such aspirins will still have to compete with the cheaper, less advertised brands of aspirin sold through the chain chemists, &c., whose products are recognizably cheaper, and equally trusted, but have to be bought in larger quantities and on the occasion of shopping expeditions to the town centre. In the long run the price and convenience of the more expensive brands must justify themselves against this competition.

But what about the short run? Is it not true that advertising's persuasive function may be much more important here? And is it not the case that there are other commodities where demand is much less stable and based upon shorter-run considerations, so that advertising may play a dominant part in consumer choice? The answer to both of these questions is 'Yes', but we must assay the difficult task of estimating the importance of these considerations. Of course, a well-directed advertising campaign will persuade some consumers to buy the advertised product, and a manufacturer may thus add to his sales in the short run at the expense of rival sellers. When we refer to this situation, however, the mistake that we make is in imagining that such a gain can be permanent. What one has done, the others can do, and a situation analogous to a price-cutting war may develop, with a continual but not very valuable snatching of customers from one to another. In a settled industry, however, this situation is not the normal one; experience leads businesses generally to decide what amount of advertising is necessary for them to hold their own in the market, to limit the amount that they spend by various rules based on experience, and generally to hold advertising down to what is normal for their type of product distributed in their way. Advertising thus does not add indefinitely to costs, and if it did, competition is such that the costs

could not be recovered in higher prices, which would favour a rival's sales. Some of the extra profits of a boom may well be put into extra advertising designed to improve consumer goodwill, but it seems doubtful to me to accept the argument that prices will be forced higher by these short-run effects of advertising so that the level of its cost is probably higher than is necessary for the type of distribution involved. Of course, when an industry is newly the subject of branding, and various manufacturers are competing for the goodwill which will enable them to get established in this market, advertising may rise to an excessive level, but this is one of the costs which will have to be borne by the business concerned. In this situation, it certainly cannot put up prices to enable it to wage the struggle more successfully.

There remains the case of the fashion goods, subject to temporary changes in demand, and where the branded manufacturer must squeeze as much out of his market as he can while it is being successful, and use advertising to enable his products to compete for the fickle goodwill of the final customer. All that can be said is that it is the essence of this sort of trade that it is fickle, and that the quality which causes the fickleness is greatly valued by the consumer. Advertising may be expensive, but it is the one condition of large-scale production being at all possible. That the development of large-scale selling and production has enabled great economies in the costs of such goods and made them much more widely available seems generally admitted, and with the admission I suggest that the case for advertising is at least strengthened.

This fickleness of demand and its liability to short-run change is an important element in many markets. For some of us, toothpaste is an article where we like successive variety, and advertisement enables us to find what is available on which to ring the changes of our likes and dislikes. In so far as such a changeable demand is an important element for these commodities (sweets are another example) the manufacturer can, once more, get the stable and large demand which is necessary for large-scale production by advertising, so that he at least holds his own.

One thing which is frequently appealed to as evidence of the irrationality of the consumer is his preference for well-advertised brands, unless the shop where he is purchasing is equally well known. There is, in fact, a lot to be said historically for his attitude. It has been said before, and it should be stressed again, that the long-run success of a manufacturer does depend upon his reputation for fair quality. Those who establish a brand have, therefore, learnt by experience that they must maintain quality. To judge by some accounts of conditions in nineteenth-century trade, in the generality of consumers' goods (such as sugar) hard-pressed competitors were too ready to take something out of the product (or put

something into it!). The development of branded goods has resulted in the setting and maintaining of much higher standards of quality. In lines where quality is hidden, because the consumer has no experience or because only actual use of a particular article can tell him what it is like, the consumer is rational in choosing to buy what has been advertised. But even here such goods will have to compete with unbranded goods from retailers whom the consumer has learnt to trust. Nevertheless, the result will be that a new manufacturer wishing to start selling branded goods—and some consumers' goods where the economies of large-scale production are important can only be sold as national brands—will have to incur the heavy costs of initial advertising.

It seems doubtful how important this is as an additional deterrent, where large-scale production *is* required from a beginner. When that is so, competition is really being limited by the general scale required; the price will still be held down by such competition, but may yield rather higher normal profits than would be the case if entry were easier. Here it can only be said that the difficulties of new enterprise coming in to expensive trades—where they are really profitable—has been exaggerated. In normal times there are enough large businesses looking round for fresh fields to conquer to provide some regularly available source of competition. It is feasible to increase that competition, by any social action which will increase the chances of smaller-scale businesses starting up where it is more appropriate for them to do so, and the chances of their being able to grow out of their profits. We can see this if we think of an industry where the large-scale manufacturers of branded goods compete with those who sell unbranded goods through other channels. The efficient manufacturer of unbranded goods may well grow to such a scale that he can put a brand on his product, and, equally, the efficient retailer may enlarge his operations, through the development of a multiple-shop system or in other ways, until he can manufacture in competition with those who previously sold to him.

The picture with which we conclude this theoretical account of some of the main ways in which competition works in retail trade is, then, of the various ways of distribution all competing with one another, and of the margins which they can get as being limited by the fact of actual or the threat of potential competition. On this view, then, in the ordinary lines of retail trade, advertising cannot raise the normal price of a commodity—that will be determined by the level of price which would satisfy the ways of selling that use less advertisement. In a stable situation, advertising costs will have to be paid out of the price which is competitively possible and will justify themselves only in so far as they enable a sufficient reduction in costs elsewhere. It is in this way that I think Mr. Bishop

is right when he stresses that, on a dynamic view, advertising has had the social function of making large-scale production possible, in lines subject to the choice of the final consumer, where that would not have been otherwise possible.

7. Conclusions

Two big issues of social policy remain undealt with. On the first, I can only offer an opinion; on the second, I do not think that economic considerations can be the final determinants of social action, for in that particular field much wider political issues are involved and the question must be settled on those wider grounds.

The first issue concerns the cost of this competitive system in terms of the profits which it allows to the business men who are its agents. It will be admitted that the theory that I have presented gives a very different picture from that which it has now become normal for economists to give. The theory of monopolistic competition presents a world where businesses, enjoying monopolies of the conventional sort, determine their prices in such a way as to maximize their net profits. This theory presupposes restriction of output by the individual firms and the twisting of consumers' preferences so as to get maximum profits out of a balance between demand considerations (which penalize increasing outputs) and cost considerations (which may favour increasing outputs, but which in fact have normally been taken as also working in such a way as to penalize outputs). The net profit arising out of such a system would have, accordingly, a strong flavour of social irrationality; given the fundamental assumptions, prices would have no necessary normal relation to costs, and the incentives to restrict output would, the greater the competition in the industry, result in businesses being too small, and enabled to survive by profits which were higher than unrestricted competition would find necessary, and therefore greater than it was in the social interest to allow.

On my view, prices are fixed on the basis of competition and will yield a normally efficient business only the competitive profit margin in the long run. At that competitive price, a business will be keen to sell all it can, and the restrictionist implications of accepted theory are quite misleading. In such a competitive system, prices have a normal relation to costs, such as was believed in by the older schools of economists, even if the nature of manufacturing and retail competition is different from that which they supposed. But what about the net profits? May it not be the case that they are 'high'? It is impossible to say what is 'high', but on the basis of my experience I should not like to call 'high' the standard of net profits which is available over a number of years to an established business in ordinary lines of manufacture or of retailing.

Of course there are speciality trades which are small in scope, which require special knowledge to enter, and where the profitability of existing enterprises may not be obvious to the potential competitor. Such situations are not typical: there are too many looking for them. In the ordinary lines of retail trade, if the profits available to a particular business are high, direct competition will tend to reduce them, when it can appear. When, because of the special services provided or the geographical isolation of the retailer, his gross margin becomes abnormal in relation to the cost of the service which he provides and the costs and qualities of competing outlets, those other outlets will gradually strengthen their position and, unless he justifies his price by still higher services which will itself force him into a more restricted market he will have to lower his prices or shrinking trade will gradually drive him out of business. The typical outlets of our urban markets will not be in such a sheltered position, and competition will react both more quickly and more sharply.

Granted that the competitive capitalist system has the sort of rationale that has been provided here, and even granted that the net profits which it yields are nowhere exorbitant, anyone who explains such a system will be expected to face up to the other question whose consideration we deferred—that is, the scope for improving the efficiency of the whole system and for increasing its social value through the conscious direction which nationalization will make possible. It may still be thought, to confine ourselves to the case of retail trade with which this paper has been chiefly concerned, that reasonable though the profits may be, the costs could be lowered through State systems of trading, standardization of products, elimination of advertising, &c. In this case, the argument runs, the social gain would be great; we should waste less resources upon the processes of distribution and should have more for the purposes of production. This argument is couched in economic terms, but it cannot be settled only on the basis of economic arguments; there are too many pre-suppositions about the way people will behave under nationalization and also about the 'wastes' of competition—i.e. the scope for improving the situation by standardizing all products and the mechanism of distribution.

The present theory does, if it is accepted, remove the grounds for one view of business behaviour—that it tended to go positively *against* the social interest—which has been much taken as supplying one very cogent economic argument for nationalization: with private enterprise being considered naturally restrictionist in the determination of prices, and with prices not necessarily relating to normal costs, at least there was a strong reason for trying to impose a greater rationality on the system, and that would require public ownership.

Moreover, the argument is often put that in some goods consumers have

never had the choice between a cheap, standardized article and a more expensive, less standardized one, because the former has never been on the market. The sort of example cited is the possibility of a really cheap motor-car if manufacture were sufficiently standardized. It may be true that under a nationalized economy consumers would prefer, if they were sufficiently cheap, the standardized products that they would get, but it is doubtful if the saving in cost would be anything like that envisaged. British manufacturers are limited by the size of the market, and what they would gain on one hand by standardization they would lose on width of appeal, particularly in the export field. Where economies from standardization are large, branded goods have already given us some of the benefits. Retail trade would still have to go through relatively small-scale channels, and to the extent that it did not, other costs would be imposed which would not be without their effect upon the productivity of the society. The efficiency of management might well deteriorate. Moreover, there is still the larger question whether a directed society can provide the same efficiency, flexibility, and capacity for taking advantage of—or rather initiating—new developments as has been shown by private enterprise, whenever it has not been too restricted by outside factors. The new ideas, the inventiveness, which determine the level of a firm's costs must spring from the fertile individual mind, not the committee system.¹ But, as I have said, this is a quasi-political question: I personally have grave doubts about nationalization working successfully in productive and distributive enterprise, but there is no touchstone by which we can be sure of the answer before we have made the experiment.

What remains true is that there is considerable scope for social action to increase the pressure of competition, as I have urged in several places in this article. It should first be said that for the last 10 years and more we have been living in very abnormal times and the system has not been allowed to work effectively, but it is capable of returning to normality, and will do so when the inflationary conditions of the sellers' markets have come completely to an end. This will be enforced by events outside our island, if we are to maintain our position in world trade and our standard of living, based as it is upon our import requirements. For one thing, it would be possible to improve our taxation system so as to remove some of the present difficulties in the way of a successful business increasing its effective competition through growth out of its profits. If competition is made sufficiently strong, we need not worry about the level of

¹ To take up the motor-car point: had nationalization been imposed in, say, 1927, we might by now be getting 1927 motor-cars at very cheap prices, but would we in such a system be able to get the *modern* motor-car so cheaply, and, failing that, would we be able to maintain output at the rate which is assumed in the calculation of the costs of such a standard motor-car?

profits in successful businesses they will be the magnet, driving force, and regulator of the whole system and a larger proportion of output will be produced at very low profits; the whole tone of the system would be improved.

Secondly, the State can help by providing much more relevant information. For example, *prompt* publication of the Censuses of Production and Distribution, with sufficiently detailed breakdown of the figures, will call attention to those areas where increased competition is likely to benefit both the new entrant and his society.

Thirdly, on the vexed question of branded goods, there may be scope for consumer research councils giving full information on what seem to be the merits and demerits of particular goods when seen by expert buyers. One difficulty here, however, is that these can only refer to quality, not to the comparative value for the price; that will depend upon the other services that are involved in the distribution and sale of the commodity and a technical evaluation of these is not so easily possible.

Finally, it is sometimes urged (largely under the force of what I have tried to argue is an erroneous view of business behaviour) that the State might directly intervene to prevent exorbitant profits or excessive advertising by price control. I doubt the feasibility of this, at all events as being likely to reduce prices below the level at which they ordinarily would stand. The danger would be that qualities and services would be reduced so as to conform to the imposed prices, in so far as they were justified competitively. Such control would also tend to be much more tender to the inefficient business than normal competition would be.

Whilst we have a private enterprise economy, it would seem natural that our policies should rather be directed at increasing competition; and on the theory that I have put forward in this paper, this would seem to be a much more feasible proposition than it has been thought to be in recent years.

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THE EQUALIZING EFFECTS OF THE DEATH DUTIES¹

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I

IN 1796, when Pitt's proposals of Legacy Duty on real estate were debated, the Bill was called 'pernicious', 'an iniquity', and 'the most execrable measure of finance that had ever come before Parliament'.²

In 1894 Harcourt's Estate Duty was called 'perfectly monstrous', 'an odious injustice', 'a revolting exercise of arbitrary power'. The maximum rate of 8 per cent. was called 'enormously high', 'throwing into shade everything that had ever been done in the way of highway robbery', and 'carrying not only sack and pillage into the houses of England but also the demon of discord and treachery'.³

In our own time a witness to the Colwyn Committee described the duties in 1927 as 'having every defect that a tax can possess'. The Committee itself in the majority report declared that the rate of Estate Duty on large estates (then reaching 40 per cent.) was, from the point of view of the effectiveness of that rate, 'already dangerously high'.⁴ In 1946 Death Duties were declared 'a penalisation on private individual's incentive'. 'One can have a cow and milk it'—it was said—'but one cannot kill the cow and still have the milk'.⁵ In 1949 'the goose had reached the maximum annual production of golden eggs'. The increase of the rate of the Estate Duty was called 'one more disincentive to saving', 'one more example of using capital as income', and 'a sop to the Party in a Budget which cannot be very palatable to them'.⁶

Three centuries of strong, and, it seems, sincere criticism have not succeeded in arresting the growth of Death Duties. The first year of war saw the Estate Duty on estates over £10,000 ranging from 6 to 65 per cent. By 1946/7 these rates were steepened on all estates over £12,500, increasing on estates over £2 m. from 65 to 75 per cent. The 1949 budget further lifted the rates on estates over £17,500 and a substantial rise in the higher

¹ I am indebted to Professor Sir Hubert Henderson for reading the typescript and suggesting important alterations, and to Mr. T. Barna for help in the statistical selection of the sample; neither of them is, of course, in any way responsible for the views expressed in this paper.

² *Parliamentary History of England*, H.C. 1818, xxxii: Fox, col. 1032; Francis and Sheridan, col. 1038.

³ *Parliamentary Debates*, H.C. 4th series, 1894, xxiv; Sir John Lubbock, col. 551; Goschen, col. 635; Gibson-Bowles, cols. 838, 839.

⁴ H.M.S.O., *Report of the Committee on National Debt and Taxation*, 1927, pp. 172, 184. Lord Colwyn was chairman of the committee.

⁵ *Parliamentary Debates*, H.C., 5th series, 1946, cccxxi: Hutchinson, col. 1867.

⁶ *Ibid.* 1949, cccclxiii: Crookshank, cols. 2237, 2238.

grades was crowned by the rate of 80 per cent. chargeable on estates over £1 m.¹ The protagonists of the increases of Death Duties, no less vociferous than their opponents, had won the day.

The provision of revenue, for which Death Duties were originally introduced, still remains the primary motive behind the recent increases. The 1946 measure, although it remitted the duty on some 150,000 estates below £2,000,² was nevertheless designed to bring in a full year an additional revenue of £22 m., and brought, in fact, a surplus of £8 m. over the budget estimate. In 1949 the estimated increase of £11 m. was designed to offset not only the loss occasioned by the abolition of the Legacy and Succession Duties, but also the loss expected from the fall of the Stock Exchange prices during the course of the year.³ Death Duties are the third largest item of Inland Revenue after Income Tax, and Profit and Excess Profit Tax, and were responsible in 1948 for a yield of £177 m. Whatever the reforms of the Death Duties, the main concern, especially in times when it is hoped to offset the inflationary pressure by a large budget surplus, is not to lose revenue.⁴

But the social temper of our time is responsible for the growth in importance of the secondary object of Death Duties. Our 'awakened and war scarred generation' has demanded more strongly than ever that we 'close from both ends the gap which separates the standard of living of the great mass of our fellow citizen from that of a small privileged minority'.⁵ On the one side the increases of real wages and the social services, on the other the progressive taxation of incomes and control of profit-seeking enterprise, represent an attempt at equalization in which Death Duties perform the function of a 'mopping-up operation'. We have now reached the point where 'there is not much further room for equalisation of incomes by taxation, but there is still a degree of inequality in the ownership of property, which may well be the subject of further adjustment'.⁶

The attention of equalitarians is thus once again focused on the Death

¹ This budget abolished, however, the Legacy and Succession Duties which charged according to the degree of consanguinity 1, 5, and 10 per cent. prior to 1947/8, and subsequently 2, 10, and 20 per cent. on gross estates over £15,000 in case of widows and children, and on net estates over £2,000 (£1,000 prior to 1947/8) in case of other beneficiaries. Rates of Estate Duty for 1944-9 are given at length in Table III (p. 182, below) cols. 11, 12, and 13; for 1919-39 in the *Ninetieth Report of the Commissioners of Inland Revenue*, table 9, p. 43; for 1894-1919 in the *Eighty-second Report*, table 8, p. 13.

² The Act exempted wholly from Estate Duty net estates between £100 and £2,000 which were previously charged 1 to 3 per cent.

³ *Parliamentary Debates*, 1949, cccclxiii: Sir Stafford Cripps, col. 2700.

⁴ The reforms of the last three years are also marked by the process of 'tidying up'. 'The urgent need for consolidation of the law relating to Death Duties' was emphasized for some time (Lt. Dymond, *Death Duties*, 10th ed., 1946, p. iv). From the 1949 reforms the Death Duty emerges as a single graduated Estate Duty levied on all estates over £2,000 according to the value of the estate.

⁵ *Parliamentary Debates*, H.C. 1946, cccxxi: Dalton, col. 1836.

⁶ *Ibid.* 1949, cccclxiii: Sir Stafford Cripps, col. 2103.

Duty, but its impact is commonly measured by the amount of tax deducted from the value of the estate at death. This 'soaking of the dead man' is incomplete as an estimate of inequality among the living. In most estates, even in those where a substantial proportion goes to one heir, there is some amount of division among other persons who have a claim of dependence upon the deceased. The size of the main bequest and of each legacy is influenced by the number of these dependents, by the amount which the duty leaves for distribution among them, and by the manner in which it is distributed. The significance of the Death Duty lies not only in the amount levied by the State, but also in its reaction on the proportion of the estate which finds its way to the main beneficiary. The examination of the redistribution between the State and the deceased which takes place upon the application of the duty needs to be supplemented by an examination of the redistribution of what remains of the estate between the individual beneficiaries. The proportion of wealth passing from one person to another at death is the real index of inequality as caused by inheritance, and the changes of the rate of the Estate Duty are only significant in so far as they affect the size of this proportion.

To obtain this proportion a sample of 281 wills representing estates over £10,000 has been taken. By estimating net benefits accruing to each heir and by comparing the largest single bequest with the probate value of the estate it will be possible to gauge the extent to which high rates of Death Duties affect the size of fortunes perpetuated by inheritance. If the proportion of estate passing as main bequest varies according to a given graduation of duty, then a similar influence may be expected when graduation is steepened as a result of budgetary reforms.

II

The presentation of the sample falls into three parts. The first deals briefly with the method (Tables I and II). The second gives the analysis and results for 1944/5 (Tables III, IV, and V). The third attempts to bring them up to date (Table VI). The probate of all wills in the sample was granted in the financial year 1944/5; it was, therefore, necessary to use the rates then in force when estimating the burden of duty. But an illustration of the effects of recent legislation might also be attempted. Thus, in the third part, the rates introduced by the reforms of 1946/7 and 1949/50 are applied.

The deduction of the value of the main bequest was reached by the following stages: (1) the selection of wills in relation to Inland Revenue statistics; (2) computation of the net value of estates; (3) calculation and deduction of Estate Duty; (4) estimate of the value of the largest bequest; (5) deduction of appropriate Legacy and Succession Duty.

1. The relation of the sample to Inland Revenue statistics is shown in Table I. In order to replace nine estates which could not be used, Class I contains all estates accepted for probate between 1 March 1944 and 30 June 1945. In the remaining classes, where a small percentage is sampled, only estates accepted for probate between May 1944 and February 1945 were considered. The estates in the highest class were collected from

TABLE I

The Relation of the Sample to Inland Revenue Statistics

Class of estate		Numbers of* English estates liable to Estate Duty in 1911/5	Percentage aimed at in sampling	Numbers of† estates in the sample
exceeding £	not exceeding £			
I. 400,000	..	52	100	56
II. 100,000	400,000	494	12.5	61
III. 40,000	100,000	1,537		77
IV. 10,000	40,000	8,682		87
Total ..	..	10,765		281

* Net estates as tabulated in the *Eighty-Eighth Report of the Commissioners of Inland Revenue*, p. 13, table 10, according to the date on which Estate Duty was paid.

† Gross estates taken at probate valuation according to the date on which probate was granted. During the war, probate was granted between 1-4 weeks after the payment of duty.

The Times and the *Daily Telegraph*. Some of the estates of Class II were also taken from *The Times*. The remainder were selected at random from the register for 1944 and 1945 at the Probate Registry. Apparently there is a slight bias in favour of estates containing charitable bequests among those published in *The Times*, but this bias must be practically non-existent as regards estates of the highest class, which were almost all included.

2. The estimate of net values in the sample was necessary prior to the deduction of Estate Duty which is levied on net estates. Net and gross values were given in the Inland Revenue statistics for the pre-war years.¹

¹ Table entitled 'Classification of all property liable to Estate Duty in Great Britain' in the appropriate *Reports of the Commissioners of Inland Revenue* until 1938/9. The Table was not given in the shortened war-time statistics.

The difference between gross and net values consists, in case of personality, of funeral expenses, debts due from the testator, and certain shares in business partnerships; in case of realty, of rent charges, mortgages, and certain other sums. Only the undistributed company reserves should here be treated as potential inheritance, but these are liable to a separate Corporation Duty.

Only the figures for net personality were given in Probate Acts. Had total net values been known when comparison with Inland Revenue figures was made, some 46 estates (16 per cent. of the total) would have been placed in a lower class than that in which they were sampled. But, in any case, probate value of estates represents only a provisional estimate. The final value is often not known for a considerable length of time owing to reversions of annuities, &c.

An average value of the difference between gross and net estates was calculated for each class on the basis of 6 years 1933/4 to 1938/9. When expressed as percentage of the gross value it was found to vary from 4 to 8 per cent. An appropriate percentage was therefore subtracted from each gross estate in the sample and the amount due as duty was deducted from the estimated net value.

3. The subtraction of the Estate Duty was effected by the application of the appropriate rate according to the 1944/5 scale. There are numerous exemptions and remissions of this duty, the intricacies of which could not be followed.¹ The amount deducted was probably too large, but the undervaluation of estates² and evasions (tacit passing of personal belongings, unreported gifts, &c.) would to some extent counteract this over-estimate.

4. The amounts outstanding after the deduction of Estate Duty represent the proportion of estates passing to beneficiaries. The inheritance of the main beneficiary, i.e. one who inherits the largest portion, was derived by subtracting from these amounts the values of minor legacies as shown in the wills. Contrary to general belief, the majority of wills allow for a straightforward division of the residue between various beneficiaries. Table II (p. 181) illustrates the degree of accuracy with which the main bequest could be ascertained.

For all estates, annuities were capitalized at 4 per cent. Fourteen were so large that a main part of the estate was necessary for their payment, and their recipients were, therefore, treated as main beneficiaries. The remaining 76, ranging from £15 to £3,000 per annum, were disregarded as ultimately reverting to the heirs. Bequests made as trusts, occurring in the majority of wills, were similarly disregarded, as in most cases the main beneficiary was one of the trustees.

5. The final deduction of Legacy and Succession Duties at 1944/5 rates

¹ The following are the main provisions which were disregarded:

- (a) Exemptions on chattels of national value. Their value is seldom given in the text of the will.
- (b) Remissions on estates of officers killed in war. They vary in each case.
- (c) Remissions on estates near the lower margin of their class. They are charged at the next lower rate of duty plus the excess over the margin. Estimate of net values in the sample made this margin uncertain.
- (d) Remissions on agricultural value of agricultural property. The charges prior to 1949 were according to the 1919 rates of duty. Since 1949 they are charged at the rates now in force with a 45 per cent. abatement for agricultural value. This is never given in the will. (Dwellings, &c., on agricultural estates do not count as agricultural value.)
- (e) Quick succession allowance. The date of death of the predecessor was not always known and in any case the value of the allowance would not be known.
- (f) Remissions in respect of settled property. Only certain reliefs in regard to settled property which passes between husband and wife, and which previously paid Estate Settlement Duty, are now in force. The information was not available.

² Table 62 of the *Ninetieth Report of the Commissioners of Inland Revenue* shows that the Accounting Parties valuation for the purpose of Death Duties in England was increased for 1946/7 by 9.13 per cent. when an official revaluation was made.

TABLE II

The Deduction of the Main Bequest from the Net Value of Estate

<i>Class of estate</i>	<i>Number of* estates in which a clear deduction was possible</i>	<i>Number of† estates in which deduction involved an estimate</i>	<i>Number of estates in which deduction was made</i>	<i>Number of‡ estates in which no deduction was possible</i>	<i>Total number of estates in the sample</i>
I	38	13	51	5	56
II	48	8	56	5	61
III	62	7	69	8	77
IV	73	6	79	8	87
Total	221	34	255	26	281

* Includes: (a) 25 wills in which an unknown bequest of a few months' wages was made to servants; (b) 8 bequests of valuable pictures and plates; (c) several bequests of chattels.

† Represents: (a) the disposition of shares the market value of which was sought for the date of the decease in the appropriate Stock Exchange journals; (b) bequests of houses valued at £4,000-£15,000 according to locality and description.

‡ Contains: (a) bequests of large landed estates; (b) shares the value of which could not be found; (c) clauses 'to all my children', &c., which made it impossible to determine the number of beneficiaries.

was made with due regard to statutory exemptions but only for the value of the main bequest. The provision made in many wills which directed the payment of these duties on all legacies out of the residue was too intricate to be observed.

III

The overall results of the sample are shown in Table III (p. 182). It gives a comparison between the numbers of testators and beneficiaries; it shows together the averages of the gross and net value of the estates;¹ it suggests in numbers the magnitude of the impact of Death Duties and of family divisions upon the size of estates; finally, it illustrates the increases of the scale of duty during the recent years.

But before the joint impact of the influences diminishing the proportion passing from hand to hand can be considered in percentages, it is necessary to investigate the importance of family considerations alone. Table IV (p. 183) illustrates the degree to which family relationship determines the choice of the main beneficiary.

Forty-two per cent. of all main bequests were left to surviving spouses. In 255 estates for which deduction was possible, 117 represent bequests to spouses. Out of 167 testators who left surviving spouses, 125 or 74 per cent. made them their main beneficiaries. Only 37 testators left the main bequest to their children while their spouse survived, and in each case the

¹ Net value is used throughout for illustration of results, except on p. 190, where for the sake of comparison probate value was used.

TABLE III

Main Bequest from Estates over £10,000 left in 1944/5

Class of estate	Numbers			Averages			Rates of Estate Duty		
	Number of estates in sample	Number of main beneficiaries	Number of estates for which deduction was possible	Average probate value of estates†	Average net value of estates†	Average portion inherited by the main beneficiary†	In 1944/5§	In 1946/7	In 1949/50
£000				£	£	£	%	%	%
Over 2,000	4	4	4	2,417,143	2,272,115	545,436	65	75	80
1,000-2,000	7	11*	5	1,402,738	1,318,574	362,400	55	70	80
750-1,000	9	10	7	816,371	767,389	327,794	48	65	75
500-750	23	30	22	612,029	568,341	197,836	46	60	70
400-500	13	17	13	458,722	422,024	188,500	41	55	65
Class I	56	82*	51	819,704	765,547	256,690	49	65	75
300-400	5	6	4	373,185	305,795	90,079†	39	55	65
200-300	13	17	12	247,730	235,343	96,593	34	45	60
150-200	11	13	10	173,058	166,136	92,579	31	40	55
100-150	32	43	30	126,957	120,607	63,228	27	35	50
Class II	61	79	56	178,657	169,965	77,536	31	40	55
80-100	9	10	8	91,042	86,489	48,739	25	30	45
60-80	16	23*	13	66,396	63,076	30,756	21	27	40
50-60	22	28*	20	55,259	52,496	32,312	20	24	35
40-50	30	44	28	45,409	43,139	22,662	16	20	28
Class III	77	105*	69	57,509	54,633	30,007	20	24	35
30-40	9	12	9	33,946	32,249	19,920	13	16	21
20-30	21	27*	18	24,694	23,460	13,522	11	12	15
15-20	22	33	21	17,237	16,203	10,921	8	10	11||
10-15	35	50*	31	12,422	11,676	7,692	6	7||	7||
Class IV	87	122*	79	18,950	17,908	11,253	8	10	10
SAMPLE	281	388*	255	224,599	210,722	79,965	34	45	60

* The number of main beneficiaries may have been more than the number indicated as two were assumed in wills in which the number was more than one but was not given. These wills are excluded from the rest of the table.

† Weighed averages are used for each complete class.

‡ The main bequest is smaller than in the subdivision below, because the four wills sampled contained a large number of minor legacies. Only the averages for each complete class represent sufficiently large aggregations to be used for illustration of results.

§ Rates of duty for 1944/5 are applied throughout the table. Later rates are added for the sake of comparison.

|| The rate of Duty was averaged to convey the impression of the increase in the upper half of the subdivision. In the rest of the table rates of duty apply (in round figures) to the average net value of estates.

spouse was amply provided for. Only 2 out of 6 people, who by-passed their nearest family, left their wives 'without a penny' and without a mention in the will. The smaller the fortune, the larger the percentage of those who left all to their wives or husbands, and the larger the proportion of those who could not provide outright for their children.

TABLE IV
The Choice of the Main Beneficiary

Class of estate	Number of estates sampled	Surviving spouse						Issue						Others					
		Testators who left a surviving spouse ¹		Testators who left the main bequest to their surviving spouse		Testators who left the main bequest to issue living		Testators who left the main bequest to their issue ²		Testators who left the main bequest to spouse instead of issue		Testators with more than one child who did not divide residue equally		Testators who disinherited their issue ³		Testators who left the main bequest to friends		Testators who left the main bequest to charities	
		No.	%*	No.†	%*	No.	%*	No.	%*	No.	%*	No.	%*	No.	%*	No.	%*	No.	%*
I	56	32	57	16	29	12	21	35	62	22	39	13	23	..	..	12	21	5	9
II	61	45	73	35	57	9	15	45	73	17	28	23	38	3	5	8	13	..	..
III	77	40	52	31	40	9	12	46	60	24	31	22	29	4	5	18	23	2	3
IV	87	50	57	13	15	7	8	52	60	21	24	30	35	1	1	10	12	2	2
SAMPLED	281	167	59	125	44	37	13	178	63	84	29	93	33	11	4	57	20	6	2

* The percentages in col. 3 relate to col. 1; in col. 5 to col. 2; in col. 7 to col. 1; in col. 11 to col. 8.

† Including 7 who divided residue equally between the spouse and children, and one who divided it between the spouse and a cousin.

‡ Two men disinherited their wives deliberately; in one case the title and estate went to nephew; one woman left the bulk to nephews because her husband was a wealthy American; one man left the bulk to charities but provided adequately for his wife.

§ Including 3 grandchildren.

|| An elderly widow with well-to-do children left all to an elderly sister.

Forty-seven per cent. of testators who left issue living made them their main beneficiaries. Forty-seven widowers and widows left the bulk of their fortunes to their children. Eighty-seven children were left the main bequest subject to life interest of their spouse¹ and a heavy proportion of them is concentrated in the lower grades of estates. Altogether 21 per cent. of testators divided the residue equally between two or more beneficiaries. Column 13 shows that equal division takes place nearly always if there is more than one child, and it confirms the view that unequal division occurs mostly in largest estates when there is enough to provide adequately for

¹ Not shown in Table IV. In these estates the spouse was counted as main beneficiary. It was impossible to adopt the children as main beneficiaries as their inheritance would be further diminished by the second application of the Death Duty on the death of the spouse. This application, however, might be to some extent offset by the quick succession allowance, by further accumulation of capital and further gifts during life. The remaining six bequests to spouses (col. 12) were made absolute.

all the dependants without giving them an equal share.¹ If estates bequeathed to spouses and charities are excluded, there are no less than 254 main beneficiaries² corresponding to 147 testators.

It is clear that testators tend to leave the main bequest to spouses rather than to children, to children rather than to other beneficiaries, and equally rather than in favour of one child. The bequests to other than nearest relatives are made only by single persons or by childless widowers or widows.³ The solidarity, the loss of which in the modern family is so often commented upon, continues to be strongly in evidence in the field of inheritance. The degree to which Death Duties diminish the size of inheritance depends on the number of divisions and aggregations taking place in the family fortune owing to the practice of bequests on the principle of consanguinity.

The significance of the general results of the sample is enhanced when estates are grouped according to consanguinity. By showing it, Table V (p. 185) allows for three interpretations of the results.

The first sees in the sample a test of the effects of one application of Death Duty without regard to the person of the main beneficiary. The duty (especially since 1949) makes no allowance for consanguinity to testator, age, and previous wealth of the beneficiary. Accordingly columns 1-4 of Table V illustrate the results for all estates, by supplying percentages of the numbers which were shown in Table III.

On the second view, it is hoped to gain greater significance from the remaining estates by excluding bequests to spouses and charities (cols. 11-13, Table V). Charities as not bequeathed to persons have little significance in the study of equalizing effects of Death Duties and may be treated separately.⁴ There are also strong reasons for a separate treatment of spouses, as in measurements of inequality most statistics treat wives and husbands as one person, and as bequests to surviving spouses only perpetuate the usufruct of property during lifetime.

But bequests to persons in the same generation as testator, are also, in a sense, made 'in survivorship', and on the third view, that full equalitarian significance of inheritance can only be measured between two generations, columns 23-5 of Table V give the results for children, nephews, and nieces alone.

¹ Compare J. Wedgwood, *The Economics of Inheritance*, Penguin edition, 1939, ch. xii, especially p. 97. All his conclusions are confirmed by Table IV.

² Obtained by deduction of cols. 4 and 17 from the numbers of testators and main beneficiaries as shown in Table III.

³ The passing over of distant relatives in favour of friends and charities is, so far as can be judged from small numbers, fairly common.

⁴ The rate of duty seems to have some effect on smaller charitable bequests. Contrary to many who left small amounts to charities, two testators expressly refused to do so on account of high taxation.

TABLE V
Proportion of Net Estate Bequeathed in 1944/5

Class of estate	When the main bequest left to.																								
	To all main beneficiaries			Spouse†			Charities			Persons other than spouses and charities			Persons in the same generation as testator			Persons in the next generation or §			More than one generation			Total			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
I	Rate of duty in 1944/5*	No. of estates included	As main bequest	As other legacies	No. of estates included	As main bequest	As other legacies	No. of estates included	As main bequest	As other legacies	No. of estates included	As main bequest	As other legacies	No. of estates included	As main bequest	As other legacies	No. of estates included	As main bequest	As other legacies	No. of estates included	As main bequest	As other legacies	No. of estates included	As main bequest	As other legacies
II	8	79	40	28	55	66	14	2	43	46	37	47	33	13	50	30	11	61	23	12	29	14	23	47	35
III	20	69	28	25	54	15	1	2	40	11	24	36	33	7	33	36	9	49	20	8	25	10	17	26	45
IV	31	56	32	18	33	37	14	5	40	11	30	31	20	8	37	14	14	39	10	6	20	11	22	28	21
SUMMARY	34	265	117	28	38	49	17	9	40	20	129	34	32	41	35	23	45	37	29	43	23	29	55	53	33

* These rates are used for calculation of minor legacies throughout the table although they apply strictly only to average estates for the whole country.

† Including 7 wives who shared equally with children and one who shared with cousin.

‡ Excluding spouses. Consists of brothers, cousins, friends, &c. Includes a negligible number of bequests to parents and uncles. Includes 10 estates which were divided equally between more than one beneficiary.

§ Includes 63 children and 22 nephews and nieces; also includes 3 grandchildren.

|| Calculated by assuming 2 main beneficiaries in col. 21.

On an average estate of the sample the duty, the main bequest, and the minor legacies each take roughly one-third of the estate.¹ At 1944 rates of duty the main bequest seldom exceeds one-half of what is left of the estate after taxation. The equalitarian effects of the duty are doubled by the voluntary distribution of the estate by testators. But average results conceal the nature of this distribution both as regards the principle of relationship on which it is based and the graduation by which it is affected.

The division of the beneficiaries according to consanguinity to testators reveals fully the impact of Death Duties on the main bequest, which varied from 37 to 79 per cent. in case of spouses (col. 6, Table V), and from 39 to 69 per cent. in case of children,² who were the only main beneficiary (col. 18, Table V). In the case of spouses minor legacies remained at a fixed ratio of some 15 per cent. irrespective of the size of the estate (col. 7, Table V). In the case of children who were the only heirs, they were fixed at about 20 per cent., if only because this figure includes 37 minor legacies accruing to spouses who were not main beneficiaries.³ Where equal division was made (cols. 21 and 22, Table V) the main bequest at 20-39 per cent. was roughly the half of the main bequest to only heirs, but other legacies varied little at 11-19 per cent. In the case of the nearest relatives the graduation of the rate of duty exercises full effect on the size of the main bequest. The commitments which the testators feel they have towards a number of dependents are met by earmarking a fairly fixed proportion of estate irrespective of duty. The rest, bearing the full brunt of the duty, goes to the main beneficiary.

The position is reversed when the main bequest was made to more remote relatives, friends, and charities. In this group testators seem to aim at a fixed proportion of the main bequest to the person of their choice. This proportion responded very little to the graduation of the duty, varying only from 37 to 50 per cent. in case of relatives and friends (col. 15, Table V), and from 40 to 46 per cent. in case of charities (col. 9, Table V). The effect of the graduation of the duty shows itself on other legacies which varied

¹ The average main bequest which includes spouses and charities actually exceeds other legacies by 10 per cent. (cols. 3 and 4, Table V), because only 8 estates bequeathed to spouses contained equal division. Main bequest to persons in the same generation as testators also exceeds other legacies by 10 per cent. (cols. 15 and 16, Table V), because only 10 equal divisions were included. But main bequest to persons in the next generation show no such excess (cols. 24 and 25, Table V) as half of the estates contained equal division (col. 20, Table V). Thus, although only one-fifth of estates in the sample were divided equally, they bring down significantly the average proportion of the main bequest.

² Nephews and nieces, when they are given the main bequest, may be regarded as dependants for whom testators feel directly responsible. There is no difference in the proportion of the main bequest for children and nephews separately. Unfortunately 18 main bequests to children were made in estates for which it was impossible to make a deduction.

³ Table IV, col. 6.

from 14 to 42 per cent. and from 11 to 46 per cent. respectively (cols. 16 and 10, Table V). But it must be remembered that the group of relatives, friends, and charities consists only of 50 estates¹ or of 17 per cent. of all estates in the sample, and that in a random selection of wills the overwhelming majority of main bequests, as Table IV indicates, would accrue to the nearest relatives and would be subject to the full effect of the graduation of the duty.²

The comparative constancy of the percentage accruing as minor legacies in the majority of estates means that the graduation of the rate of duty had in 1944 a much greater influence on the reduction of the main bequest than on the reduction of other commitments. Thus, it is not sufficient to account for the equalitarian effects of the duty by a simple deduction from the total estate of its statutory amount. In order to make a complete estimate it would be necessary to add to the burden of the actual duty an additional 15-20 per cent. for other legacies. The burden of the duty on an estimate of £1 m. would thus be not 65 per cent. but some 80-5 per cent.; on an estate of £100,000 not 30 per cent. but some 45-50 per cent.; on an estate of £10,000 not 6 per cent. but some 20-5 per cent. For the whole of the sample the State became a recipient of a larger share of estate than the main bequest before the estate reached £1 m. and incurred a charge of 55 per cent.; this occurred, because of minor legacies, when estates reached the value of £300,000.

IV

An attempt must now be made to bring the sample up to date since its results apply only to conditions prevailing in 1944/5. It would be unremunerative, at present, to attempt a new sample of wills really liable to 1946/7 rates of duty, as this has now ceased to apply. As to the wills liable to duty at the rates introduced in 1949/50, technical difficulties will preclude their sampling for at least another year.

Two stages of analysis help to trace the effects of the application of 1946 and 1949 rates of duty to the sample. First, by preserving the 1944 ratio of

¹ Without nephews and nieces. These estates have for our purpose little connexion with the graduation of duty, as irrespective of it the main bequest is always 40-50 per cent. of the total estate. Unless one wishes to deal with bequests to remote relatives specifically, they must be disregarded in the general rule for quick calculation of the combined burden of duty and legacies, which is put forward in the next paragraph, and which only applies to estates bequeathed to nearest relatives.

² These trends are based on averages from which important exceptions can occur. It is clearly possible to meet cases where legacies (especially to friends and charities) would not be made in order to offset the effect of high rate of duty on the bequest to a near relative (such as the spouse). The same might happen in estates passing to remote relatives, where the main bequest to, say, an uncle might be made smaller in order to preserve intact minor legacies to, say, several aunts.

TABLE VI

*Distribution of the Net Estate Bequeathed in 1946/7 and 1949/50**

Class of estate	To all main beneficiaries			When the main bequest left to:													
				Spouses		Charities		Persons other than spouses and charities		Persons in the same generation as testators		Persons in the next generation					
												One heir		More than one equally		Together	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	Rate of duty	As main bequest	As other legacies	As main bequest	As other legacies	As main bequest	As other legacies	As main bequest	As other legacies	As main bequest	As other legacies	As main bequest	As other legacies	As main bequest	As other legacies	As main bequest	As other legacies
I	65	23	12	25	10	27	8	21	14	25	10	26	9	14	7	19	16
II	40	40	20	47	13	..	..	31	29	28	32	43	17	22	16	31	29
III	24	52	24	63	13	41	35	44	32	47	29	58	18	31	14	42	34
IV	10	62	28	77	13	45	45	48	42	50	40	67	23	37	16	48	42
SAMPLE	45	32	23	42	13	33	22	28	27	31	24	33	22	21	13	28	27

At 1946/7 rates of Duty.† (Figures represent percentages)

I	75	16	9	18	7	20	5	15	10	18	7	19	6	10	5	15	10
II	55	30	15	35	10	..	..	23	22	22	23	32	23	16	13	23	22
III	35	44	21	54	11	35	30	38	27	40	25	49	16	27	11	36	29
IV	10	62	28	77	13	45	45	48	42	50	40	67	23	37	16	48	42
SAMPLE	60	22	18	32	8	27	13	23	17	25	15	24	16	15	10	22	18

At 1949/50 rates of Duty.‡ (Figures represent percentages)

* The annotations to Table V apply also to this table. It is based upon the assumption that the relative magnitude of the main bequest and of other legacies is the same as in Table V.

† Death Duty deductions are no longer correct for 1947/8 and 1948/9 when Legacy and Succession Duty should be applied at a double rate of 2, 10, and 20 per cent. But 200 out of 281 estates were left to spouses and issue and were thus charged at the lowest rate of Legacy and Succession Duty.

‡ Death Duty involves an overestimate. No Legacy and Succession Duty should have been charged owing to its abolition in that year. But again the overcharge is made mostly at the lowest rate of duty.

the main bequest to other legacies,¹ Table VI shows what would have happened if the testators in the sample had lived until 1946 or 1949, without altering their wills as a result of recent duty reforms. Secondly,

¹ If the main bequest were to be diminished by the full increase of the duty, in order to preserve intact the amount of other legacies, it would have to be cut so considerably that it might cease to be the main bequest, by becoming less than individual legacies. Thus, in Class I, the main bequest to persons in the next generation would dwindle between 1944 and 1949 from 28 to 6 per cent. On the other hand, the main bequest could not always be kept intact by cancelling all other legacies. In Class I, the increase of duty exceeded by 8 per cent. the 1949 proportion of minor legacies.

one must consider the possibility of a change of testamentary habits following upon the introduction of steeper graduation.

1. The increase of the duty on an average estate of the sample leaves for distribution 55 per cent. in 1946/7 and 40 per cent. in 1949/50, as against 66 per cent. in 1944/5. Owing to the assumption of the 1944 ratio, this amount is still divided equally between the main beneficiary and other legatees.¹ In the lower ranges of estates the duty was not much changed, but in the higher ranges almost a further quarter was taken by taxation. No more than some 20 per cent. of the residue seems now to pass from hand to hand as an average inheritance.

The significance of the rates of duty lies mainly in their average values, which are usually quoted far less often than their importance warrants. But in the case of 1949 reforms the effect of the duty on estates of millionaires affords an illuminating illustration. In 1923 'when a millionaire died he was replaced by another millionaire'.² Nowadays there are still, it seems, some 700 millionaires, about 50 of whom own estates of no less than £2½ m.³ But 'an heir to a million' is a thing of the past. Of 16 estates of millionaires which fell liable to duty in 1945/6 and 1946/7, only one estate reached each year the figure of £3 m. Thus, at the rate of duty at 80 per cent. plus 10 per cent. for minor legacies (col. 9, Table VI) it must be unusual for anyone to inherit more than £300,000. Moreover, if the minor legacies are maintained at 10 per cent. of the total estate, by reducing the taxable estate from £1 m. to £500,000 the share of the heir would not be reduced at all. The incentive to dissaving would thus seem considerable, and but for the desire for power it would mean the extinction of this class.⁴

¹ The role of estates containing equal divisions is similar to that described in note 1, p. 186.

² Sir Henry Clay, *Property and Inheritance*, 1923, p. 28.

³ These figures are arrived at, for 1945/6, by assuming 4 per cent. as average yield of capital, and applying this percentage to the Surtax Statistics of the *Ninetieth Report of the Commissioners of Inland Revenue*, table 48, Surtax-Classification of Incomes in the U.K. When used with table 46 for amounts left after taxation (supplemented by table 43 of the previous report for the rates of Income Tax), these figures tally with those given in table 36 of the *National Income and Expenditure 1938-1946*, Cmd. 7099. Between 1946 and 1947 the number of persons receiving income of not less than £10,000 increased from 8,000 to 10,000 (*National Income and Expenditure 1947*, Cmd. 7271, table 6; and Cmd. 7648, table 9). But comparison with the Estate Duty figures was impossible because the *Ninety-First Report of the Inland Revenue* had not yet been published. The income method ignores the existence of the earned incomes, which according to Lord Stamp ('Inheritance as an Economic Factor', *Economic Journal*, Sept. 1926, p. 357) accrue to some 90 per cent. of able-bodied rich men. Table 49 of the *Ninetieth Report of the Inland Revenue* shows that 49 per cent. of income receivers of £20,000 earn no more than 10 per cent. of their income, 57 per cent. no more than 20 per cent., 71 per cent. no more than 50 per cent.; E. C. Rhodes ('The Distribution of Earned and Investment Incomes', *Economica*, Feb. 1949, p. 64) shows that 'the incomes of £20,000 or more are mainly investment incomes'; but for surtax-payers as a whole the proportion of earned to total income is, according to those sources, no less than one half.

⁴ A. C. Pigou (*A Study of Public Finance*, 1947, p. 143) made an up-to-date analysis of the motives which still prompt testators to maximize their main bequest.

As the 1944 ratio of the main bequest to other legacies has been preserved, the increase of the duty in 1946 and 1949 still affects fully the proportion of the main bequest to nearest relatives, and hardly at all the proportion of other legacies, while in the case of remote relatives the opposite is the case. But owing to considerable steepening in the upper ranges of the duty, exceptions from these trends must be made in Classes I and II. In the cases of only-heirs and co-heirs in the next generation, legacies in Class I (cols. 13 and 15 of Table VI) were no longer 20 per cent. of the residue as in 1944, but some 10 per cent. in 1946, and some 5 per cent. in 1949. Similarly the main bequests to remote relative and charities are nearer to 20 per cent. than 40 per cent. of the residue in Classes I and II (cols. 6 and 10, Table VI). These notable exceptions must be borne in mind when comparing the effects of the duty in 1949 with those established for 1944. The rise of the duty in larger estates brought about considerable reductions in the capital available for distribution at death, even if one assumes that the habits of the testators have not changed as a result of this rise. Thanks to the new rate of duty, the lowest range at which (for the whole of the sample) the State would become the largest participant in the inheritance would be shifted from £300,000 in 1944 to £60,000 in 1949.

2. An inquiry must now be made into the validity of continuing to apply the 1944 ratio of the main bequest to other legacies, which implied that testators would not alter their wills as a result of Death Duty reforms.

It has been shown that a given graduation influences the size of the main bequest in estates left to nearest relatives, i.e. in the majority of estates. It seems arguable that a steepening of graduation due to reforms would also in the same type of estates affect the size of the main bequest.

A comparison of main bequests to persons in the next generation about the year 1900 and in 1944 seems to confirm this view. In estates over £10,000, with the duty ranging only between 4 and 8 per cent., the main bequest averaged from 35 to 56 per cent. about the year 1900.¹ In the lower ranges of estates the 1944 bequest of 43 per cent. in an average estate of £18,000² exceeds the 1900 figure of 35 per cent. in an average estate of £15,000, but in any case there has been no appreciable increase of duty in these ranges. But in the middle and upper ranges, where the steepening of the graduation proceeded by leaps and bounds, the proportion of the main bequest has fallen from 41 per cent. on an average estate of £200,000 to 34 per cent. on an average estate of £180,000, and from 56 per cent. on an average estate of £400,000 to 26 per cent. on an average estate of £800,000.

¹ J. Wedgewood, *op. cit.*, table IV, p. 178, and description, p. 177. See also note 2, p. 193.

² The results here used are those for main beneficiaries in the next generation (Table V, col. 24) adjusted against Table III in order to represent percentages of probate value of estates.

Thus, in the long run, increasing Death Duties are a factor of importance in the revision of accepted testamentary habits, because they leave so much less for distribution among heirs. But, in the short run, it is not likely that steepening of graduation will be at once offset by altered provisions in the wills. It is not certain whether testators consider at all the extent of the duty which is likely to fall upon them.¹ Younger testators must know only very hazily the future value of their estate and the rate of duty in force at the unknown and, it is hoped, distant date of their demise. Older men are often unwilling (because it violates their habits) to alter their wills as a result of increased rates of duty. The great majority of sampled wills were drawn up during the recent war, but the remainder were made at all dates between 1928 and 1939 when the rates of duty were lower than in 1944. In a few cases the dispositions regarding legacies and annuities could not be carried out in full owing to an insufficient amount being left after the payment of the duty in force in 1944.

V

If the representativeness of the sample is not questioned, it may perhaps be worth while to attempt as a final conclusion a tentative generalization for the country as a whole.

As regards testators, excluding those who bequeathed to spouses and charities, the combined effect of Death Duties and minor legacies seems to be as follows: in 1944/5, some 30 persons worth over £400,000 left some £260,000 to their main beneficiaries; some 200 persons worth between £100,000 and £400,000 left an average main bequest of £65,000; some 800 persons worth £40,000-£100,000 left an average main bequest of some £25,000; some 4,000 persons worth £10,000-£40,000 left no less than £8,000 to their main beneficiaries.

¹ Writers who calculate the burden of Death Duties in terms of an Annual Tax assume that they do. Cf. T. Barns's 'The Burden of Death Duties in Terms of an Annual Tax', *Review of Economic Studies*, Nov. 1941, p. 28; N. Kaldor's 'The Burden of Capital Taxes', *ibid.*, Summer 1942, p. 138; Barns's criticism of Kaldor's method in *Redistribution of Incomes Through Public Taxation in 1937*, 1942, p. 118. These studies contain everything that is known up to date about the burden of Death Duties on investment incomes, including the description of the Colwyn Committee's insurance method and previous bibliography. The methods used are based on the assumption that Death Duties 'would certainly be taken into account by a reasonable man in assessing the weight of taxation he had to bear' (G. F. Shirras and L. Rostas, *The Burden of British Taxation*, 1942, p. 76). Compare this with J. R. Hicks (*The Social Framework*, 1942, p. 188, n. 1), who says that 'people do not normally consider that their payments of Death Duties come out of income'. E. Kingsley Read (in I. A. Thurston, 'Death Duties and Valuations of Reversions for Estate Duty Purposes', *Journal of the Institute of Actuaries*, 1935, p. 395) drew attention to the drawbacks of insurance against Death Duties. G. F. Shirras (*Public Finance*, 1936, p. 539, n. 1) estimated that on an estate bringing total unearned income of £50,000 the cost of taxation and insurance against Death Duties would amount for married men with three children and at the rates then in force, to more than the income available.

But as regards beneficiaries, nothing conclusive can unfortunately be said. The bequests indicated above may have been only an addition to the wealth which they already possessed, if only because, owing to low birth-rate of their social class, they might have benefited previously from bequests of other childless relatives and wealthy friends.¹ Their numbers for the country as a whole² seem to be: 55 in Class I, 350 in Class II, 1,400 in Class III, and 7,500 in Class IV. But no significance can be attached to these figures until they are corrected by the addition of the number of all minor legatees in larger estates, whose legacies exceeded the size of the main bequest in smaller estates, and further corrected by subtraction of the number of beneficiaries who have been counted more than once owing to their inheritance of the main bequest from more than one testator.

Altogether out of just under 11,000 persons who died in England in 1944/5 owning estates of no less than £10,000, one-half left an average bequest of about £100,000 to their spouses. The remaining 5,000 people who left their fortunes to their children, or if childless to their relatives and friends,³ bequeathed on the average some £80,000 to their main beneficiaries. If these figures are to give a picture of the effects of the duties and legacies in 1949/50, the total number of testators must be increased from some 11,000 to some 12,500. The number of main beneficiaries would, subject to qualifications given above, rise from some 9,000 to some 10,500, excluding spouses and charities. The average main bequest would then be decreased from £80,000 to some £55,000. At the extreme ends of the scale the main bequest would, at 1949 rates, rarely exceed £300,000, and it would not be less than £4,000.

This final result must be accompanied by three following qualifications:

Firstly, it is not certain how far the effects of the duty are offset by accumulation during lifetime.⁴ The numbers of estates falling liable to Death Duties have been steadily increasing in each class of estates. The number of small estates had, it is true, increased faster. Between 1938/9 and 1945/6, estates between £100 and £10,000 increased by 44 per cent.,

¹ Compare H. Dalton, *Inequality of Incomes*, 1935, p. 309. J. Wodgewood (op. cit., p. 163 and note 1) estimated on the basis of Legacy and Succession Duty figures that property received from one testator was roughly one-half of property received from all sources by way of inheritance.

² The figures are obtained by reconstructing for the numbers of estates liable to duty in England in 1944 (Table I) the proportion between the numbers of testators and beneficiaries for the whole sample (Table III), and the same proportion for numbers which exclude estates bequeathed to spouses and charities (Tables III and IV).

³ Only about 300 estates seem to have been left to charities.

⁴ J. R. Hicks, op. cit., p. 186, says that 'Death Duties prevent large fortunes from becoming even larger, but leave enough to build up large fortunes again with inheritance'. Also Sir Hubert Henderson, *Inheritance and Inequality*, 1926, p. 15: 'Had it not been for Death Duties Great Britain would have become by now a Paradise of the Idle Rich in a degree far greater than is actually the case.'

while the corresponding percentage for estates over £10,000 was only 31 per cent.¹ This may be due to the diminution of the number of larger estates owing to steeper graduation, but the Estate Duty statistics are obscured by the inflationary pressure, which continually brings into a higher taxable class estates which would previously have been exempted or taxed at a lower level. It is asserted that the maintenance of the number of all estates is due to 'forces of private capital accumulation working through company savings' to replenish the size of estates during a lifetime.² The contention that Death Duties began to yield diminishing returns has been vigorously denied.³ The clear working of the duty is visible only in the disintegration of landed estates, manifested recently in the donations to the National Trust, and in the provision that property can be accepted in payment of Death Duty. But since landed estates are subject to exceptional reliefs⁴ their passing may be as much an evidence of the fact that they have ceased to be profitable and self-supporting investments.

Secondly, the equalitarian effects of the Death Duty are obscured by the existence of gifts *inter vivos*. Their magnitude cannot unfortunately be accounted for.⁵ It is even more difficult to determine what proportion of them is made solely to evade duty (as distinct from provision for genuine needs of the dependants and from evasion of surtax), and how far this proportion increases with the successive increases of the rate of duty.

¹ U. K. Hicks (*The Finance of the British Government 1920-36*, p. 176, and table 3, p. 178) analysed the numbers of estates liable to Estate Duty between 1920 and 1935 and found that estates between £10,000 and £100,000 increased by 83 per cent., while estates between £100,000 and £1 m. increased only by 70 per cent. She concluded that 'the inroads of the Death Duties into the National Wealth have not been very serious', but anticipated a decline in the number of estates liable to duty after 1935, which did not take place.

² *Parliamentary Debates*, 1949, ccclxiii: Jay, col. 2661.

Lord Stamp ('Inheritance—a Sample Inquiry', *Economic Journal*, Dec. 1930) and J. Wedgwood (op. cit., ch. vi) have estimated the proportion of inheritance to wealth made during lifetime. The former as Chairman of the Special Committee on Inheritance, Section F of the British Association, collected 56 estates over £5,000. His proportion of inheritances to fortunes left in 19 cases before 1924, and in 37 cases between 1924 and 1930, was 10 per cent. for the sample and 14 per cent. for the country. The latter examined 240 estates over £10,000 left between 1924 and 1926 and found roughly that about one-third of the successors owed their fortunes almost entirely to inheritance (including gifts *inter vivos*), another third largely to a combination of ability and luck with a considerable inheritance of wealth and business opportunity, and the remaining third largely to their own activities. This result is more convincing than the former which may well be unrepresentative, and from which Lord Stamp was chary to draw any general conclusions. It is too early yet to try to test the extent to which Death Duties (doubled in higher ranges since the time of the above samples) will have affected the proportion of wealth inherited to wealth made during life at the present time.

³ *Parliamentary Debates*, H.C. 1949, Peake, col. 2671, and reply by Sir Stafford Cripps, col. 2700.

⁴ See p. 180, n. 1(d).

⁵ J. Wedgwood, op. cit., ch. x, estimated that in estates over £50,000 no less than a quarter of property is given away to heirs and others during lifetime (p. 246). A new opportunity for estimating the gifts *inter vivos* (but not necessarily as evasions of duty) presents itself in estates of officers of well-to-do families fallen in war during the lifetime of their parents.

Some writers assert that the steepening of the rate of duty inevitably increases the volume of gifts, thus reducing considerably the size of taxable estates.¹ Others maintain that this is not the case.² However large and variable the gifts, if they are made according to the same pattern as bequests by will, their effect on the size of estates does not prejudice the significance of the results expressed by percentages. But if the gifts alter not only the amount accruing to each beneficiary, but also the proportion of the benefit of the main beneficiary (presumably by increasing it in relation to the total estate),³ their existence and fluctuation deprives the results of the sample of some part of their significance. But the distortion of the results of the sample does not necessarily imply that owing to larger gifts the increased rates of duty are deprived of their additional equalizing effect. On the one side, by saving large amounts which would otherwise be subject to taxation, the gifts swell the total amount of property received gratuitously and obstruct the equalizing effects of the duty. But, on the other hand, it has been pointed out that they reduce inequality between persons by lessening the concentration and earning potentialities of capital in the hands of single individuals.⁴ The additional equalizing effects of steeper graduation could thus be measured by the increase of the volume of gifts of which it is the cause, after the deduction of the loss of revenue, of which the increased gifts deprived the Exchequer.

The third and last qualification suggests that the scope of the duty is limited by the small number of persons which it affects. The increases of the duty apply to a considerable amount of property in private hands, only because it is unequally concentrated. Only 50,000 out of 600,000 estates changing hands every year prior to Finance Act, 1946, were since that date to be liable to duty. Thirty-seven thousand estates below £12,500 have had the burden of duty reduced or unchanged. Only just over 10,000 estates were affected by 1946 increases. They represent £396 m.

¹ Sir Hubert Henderson (op. cit., pp. 16-17) says that high Death Duties encourage evasions by inducing men to think 'that it is rather a mug's game to save and leave their money to their children in the ordinary straightforward way. . . . If we contemplate a stiff increase in the scale of Death Duties, the danger of stimulating evasions is a cogent practical objection which we must take into account.'

² H. Laski (*Grammar of Politics*, 1938, pp. 536-7) writes: 'I believe myself that the effects of donations *inter vivos* can easily be exaggerated. Anyone who studies day by day the habits of wealthy men, as their wills reveal those habits, will realise that they do not, in general, desire to distribute their possessions in their lifetime.'

³ Experience suggests that where there is more than one child the gifts do not alter the proportions bequeathed by will. There is a tendency in the wills to compensate those children who have not received equal amounts by gifts. The fact that, in spite of this, equal divisions prevail seems to prove that gifts are also distributed equally among children, unless there are special needs. But where there is only one main beneficiary, it may well be that gifts made to him do not bear the same proportion to other gifts as the main bequest to other legacies.

⁴ H. Campion (*Public and Private Property*, 1939, p. 6). Also H. Dalton, op. cit., p. 326, and Sir Henry Clay, op. cit., p. 29.

or nearly 60 per cent. of the total amount then liable to duty.¹ Out of £750 m. which now falls liable each year, only £175 m. are taken by the duty.²

The amount of the main bequest as left by the duty, varying as it does from £4,000 to £300,000, represents still, from the point of view of the less privileged, a handsome inheritance and an enviable advantage. The lower ranges of this inheritance may be taken to provide a reasonable nucleus with which to start life;³ but the upper fringes, although drastically reduced if judged by older standards, still represent a good-sized fortune, especially when reinforced, as they usually are, by a capital of hereditary ability, exclusive education, and social connexion. The fact that inheritance usually comes in middle age when the recipients are comparatively settled in life⁴ further enhances its description as a luxury, and justifies the equalizing application of the Death Duty.

VI

The contents of this paper may be summarized as follows: 281 English estates over £10,000 were sampled in 1944 in order to determine the proportion of wealth passing owing to death from one person to another. For 255 estates it was possible to make an estimate. It was found that in spite of the duty on the average estate of the sample being only 34 per cent., no more than about one-third was inherited by the main beneficiary. When 1946 and 1949 rates of duty (averaging 45 and 60 per cent.) were

¹ *Parliamentary Debates*, H.C. 1946, cccxxi: Dalton, col. 1836.

² *Ibid.*, H.C. 1949, cccclxiii: Jay, col. 2662.

³ Sir Henry Clay (op. cit., p. 28) suggested a compulsory subdivision of the non-taxed portion of the estate, which would ensure a minimum of £5,000 free from subdivision, and would progress so as to leave 60 per cent. out of an estate of £10,000 up to the maximum of 5 per cent. out of an estate of £1 m. for the main beneficiary. Two years later Lord Simon of Wythenshawe (as he now is) suggested £100,000 as maximum inheritance on Mill's principle (*Inheritance of Riches*, 1925). It is remarkable how all these proposals coincided with what is now actually left to the main beneficiary.

Of other proposals to limit the right of inheritance that originated by E. Rignano (E. Rignano and Lord Stamp, *Social Significance of Death Duties*, 1926) and sponsored as Reinheritance Tax by all the authorities quoted in these pages came to an abortive end with the article by H. C. Scott ('Some Administrative Aspects of the Rignano Scheme of Inheritance Taxation', *Journal of the Royal Statistical Society*, March 1926) in which his objections were wound up as follows: 'If Rignano's historical thesis is correct, then by the time the property owning classes are sufficiently concerned to be willing to concede such a solution to their relations with the proletariat, much bigger things are likely to happen than the Rignano scheme' (p. 282). The 1949 reforms have revived in the Budget Debate (vol. cccclxiii: Galbraith, col. 2689) and in the letters to *The Times* (Sir Cecil Kisch, 12 April; R. W. Oliver, 18 April), the proposals for Lord Randolph Churchill's Legacy Duty, and for reliefs to widows, &c. It might thus be a good time to revive the Reinheritance Tax projects as proposed by Dr. Dalton in his evidence before the Committee on National Debt and Taxation (Colwyn) (p. 316) or by Sir Hubert Henderson (op. cit., p. 10).

⁴ In Class I, where age and occupation of the main beneficiaries were investigated, there were (among 21 male heirs) only 4 persons under the age of 21 (2 of whom were grandsons), and only 1 adult who had no remunerative occupation.

applied to the sample, it was found that the proportion of the main bequest was further reduced by some 10–15 per cent. At the latter rate the combination of the Death Duty and minor legacies was found to limit all main inheritances from £4,000 to £300,000.

It was observed that in estates inherited by spouses, children, nephews, and nieces the proportion of the main bequest varied with the increases of the duty, while the proportion of other legacies remained fixed; in estates inherited by other relatives, friends, and charities the opposite tendency was in evidence. The latter account for only 17 per cent. of all estates in the sample. On the basis of the former it was concluded that for quick calculation of the combined burden of the duty and minor legacies, some 15–20 per cent. should be deemed to have passed as minor legacies, and should be added to the rate of duty to reach a full estimate of its equalizing effect.

Since the institution of inheritance operates almost exclusively in the sphere of the family, preference being given to spouses before children and to children before other beneficiaries, the equalizing effects of the duty apply most strongly to the family. Thus, the duty tends to control the desire to provide for one's dependants at the point where it ceases to be applied on the criterion of security, and where it seeks to perpetuate advantages inconsistent with the equalizing tendencies of our time.

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PRODUCTIVITY AND THE BUSINESS MAN

By P. W. S. ANDREWS and ELIZABETH BRUNNER

Introduction

THIS paper reports some results of an inquiry into the factors affecting industrial productivity carried out after the war by a Research Group of economists teaching in Oxford who meet under the chairmanship of Mr. R. F. Harrod.¹ This is the successor to the pre-war Oxford Economists' Research Group which carried out pioneer researches involving the questioning of business men and others on matters of interest to economists. Some of the results of these, on the relation of costs to prices, on competitive and imperfectly competitive behaviour, and on the effect of changes in the rate of interest on investment decisions, were published in the first three issues of *Oxford Economic Papers*.

After the interruption of the war years the Research Group resumed activities in 1947. The inquiry which it then took up differed from those undertaken before the war in that it was not so closely related to theoretical issues in economics. The subject of industrial productivity, however, was of very great contemporary interest, and it was decided to seek business men's opinions on some aspects of the problem.

Selected business men were asked to meet the group in Oxford. In addition, one member of the group interviewed some businesses in Northern Ireland. In all cases the business man held a high position in his business—usually that of managing director or chairman. This inquiry extended from March 1947 to May 1949. The time-lag may sometimes affect the balance of the replies as to the 'post-war' position, but in the tabulation of replies the firms are listed in the order in which the evidence was given to the group, and the date noted. The size class of the business is indicated and also the type of product where it seems to be relevant.

A question paper was prepared to serve as the basis for discussion and for further questioning at the meeting. A copy was sent to each business man in advance. The particular topics which were discussed and the stress

¹ The membership of the Research Group has varied over the period of the inquiry, but at the date of this report it was as follows: R. F. Harrod (Chairman), F. A. Burchardt, Professor D. G. Champernowne, D. N. Chester, Sir Henry Clay, C. A. R. Croxall, Margaret Hall, E. L. Hargreaves, Professor Sir Hubert Henderson, E. M. Hugh-Jones, Professor J. Jewkes, N. H. Loyland, G. D. A. MacDougall, C. N. Ward-Perkins, T. Wilson, P. W. S. Andrews (Secretary), Elizabeth Brunner (Assistant Secretary).

Whilst the original research, as will be clear, has been a co-operative activity, responsibility for the balance of the report and for general observations must lie with its authors, who, subject to that responsibility, would like to acknowledge the criticisms and suggestions that they received from members of the group when this report was being prepared for publication.

that was given to them depended upon the interest of the business man and the course of the meeting itself.

Before proceeding to the report proper, it remains only to express the sincere thanks of the Research Group to the, necessarily anonymous, business men who have so willingly given us their time and their interest. In this connexion, the authors regret that, because of its summary nature, this report must lack the freshness and interest of the original discussions.

Description of businesses

Altogether we have evidence for twenty-four businesses, though not all have answered every question.

Their geographical location is as follows:

Southern England	7	Scotland	2
Midlands	3	Northern Ireland	5
North of England	5	Multi-location	2

In order to avoid disclosing the identity of a witness, the products made by the businesses concerned cannot be given precisely, but the following tabulation indicates the types of product; it will be seen that about half the businesses were in the engineering industries:

Cotton	2	Electrical engineering	3
Other textiles	2	Mechanical engineering	3
Clothing	1	Chemical engineering	1
Food products	2	Domestic equipment	2
Printing and paper products	2	Aircraft	1
Leather products	1	Shipbuilding	1
Metal products	3		

Businesses have been classified for size according to the number of persons employed in the unit of management for which the business man was responsible. In most cases this figure was the same as that for the firm; in seven of these cases the witness was chairman or secretary of a firm running several factories. In two cases, however, where the witness was general manager of a single works in a multi-factory firm, the figure was, of course, lower than that for the firm.

Our sample of businesses shows a concentration at the extreme ends of the size scale. We shall occasionally refer to them by numbers which run in order of size of 'establishment' in the sense of the managerial unit. The smallest establishments, Nos. 1-5, employ under 250 persons each, and No. 6 under 500. Nos. 7-13 are establishments with over 500 but less than 1,000 employees. Then, with the exception of No. 14, which employs c. 2,000, the sizes of the establishments make a large jump to c. 5,000; the remainder of our witnesses, Nos. 15-24, were responsible for establishments employing 5,000 or over. This gap in our size range may have implications for the representativeness of our evidence in so far as the problems of

management in the intermediate-sized business may have special repercussions upon labour organization and productivity.

With our data, therefore, the following classification into size classes has been made:¹

<i>Size class</i>	<i>Establishments</i>
<i>Small</i> , employing up to 500 persons in the unit of management:	6 (Nos. 1-6).
<i>Medium</i> , " 500-2,000 " " " " " " " :	8 (Nos. 7-14).
<i>Large</i> , " 5,000 and over " " " " " " " " :	10 (Nos. 15-24).

It will, of course, be realized that a small business, classified solely with reference to the persons employed, may be a large business in its particular industry.

I. PRODUCTIVITY AND ITS VARIATIONS

1. *How do you measure productivity in your business?*

The primary sense of productivity is that of output (quantity or value) per head in a given period of time. In recent discussion it has also been used in the sense of intensity of labour effort. All our business men could construct some sort of measure of productivity in the first sense, in value terms at least, for the business as a whole and in quantity terms for particular departments, since routine accounting always gives figures for money turnover, and quantity records are usually kept whenever goods go through defined stages of production. In the latter case the measure used must depend on the nature of the business—it may be possible to count actual units of product, such as the number of jellies produced per worker per hour, or the measure may be in terms of tonnage produced, or

¹ For purposes of comparison the figures of the 1935 Census are given below showing how the 49,000 establishments in Factory Trades employing 5.2 million persons were distributed; and a comparable break-up of our data is given alongside:

<i>Size of establishment (persons employed)</i>	<i>Census of production</i>		<i>Present sample of 24 businesses, % of total establishments</i>
	<i>% of total establishments</i>	<i>% of total persons employed</i>	
11-99	76.8	25.6	4.2
100-999	18.7	33.9	25.0
1,000-999	3.4	19.1	25.0
1,000 and over	1.1	21.4	45.8

Our sample is thus heavily overweighted on the larger end of the size scale. Indeed, the tabulation of the census data disguises the extent of the overweighting. The largest size class of establishments in the census cannot be subdivided, but, out of the 41,000 firms enumerated in the Factory Trades, 1.6 per cent. employed more than 1,000 workers, and most of these (1.4 per cent.) employed between 1,000 and 5,000 workers. But each of our firms employing over 1,000 workers, with one exception, employs 5,000 or over. Although it is clear that we have not secured sufficient evidence of the opinions and experience of smaller businesses, it will be soon that larger businesses employ a considerable proportion of the country's labour force; they are, therefore, more representative of employment conditions than the mere numbers of such businesses would indicate.

more indirectly by usage of important materials, such as the amount of steel cut up, or, again, by the working hours of the machinery. In cotton the O.H.P. criterion (operative hours per unit of product) is coming into general use as a measure of physical productivity. O.H.P., of course, goes in the opposite direction to a measure relating output to employees; an increase in productivity will lower O.H.P. but increase P.M.H.

On reading our evidence one cannot avoid the impression that, in general, except for one or two statistically minded witnesses, such records were mentioned just because they were kept for other purposes or as part of the routine of administration and we had seemed to ask for them—very few of the witnesses ever referred to them again in subsequent discussion. Any figure of money turnover per operative is, of course, so general as to be difficult to interpret in 'productivity' terms. Not much attention seemed to be paid to measures of average productivity in the business as a whole; the business man's attention is, naturally, more directed to what is happening at the particular points of the business where control can be exercised. This is where particular quantity records come in, but even here the 'sense of what is happening' is so often needed for interpretation that it is more important than the figures. A business man may find it useful to use such figures to check his sense of what is actually happening, without their being at all useful for longer period comparisons.

On the other hand, many of our business men referred specifically to the question of measuring productivity in the sense of effort put out by individual workpeople and seemed to find this of more interest. The earnings of piece-rate workers were often taken as a measure of productivity in this sense. Any system of piece-rates, of course, will provide an indication of changes in output which will be reliable so long as the basis of the rates has not changed. Records of piece-rate earnings could be aggregated into a general index of output on the part of the workpeople concerned, but it would not be proportional to effort in so far as piece-rate earnings were affected by overtime or by minimum wage agreements when less than standard hours were worked, &c. Of course, their use for long-period comparisons would be vitiated by wage changes, changes in the make-up of the output, and by changes in the distribution of the labour force between differently paid operations. The measures cited varied from a crude measurement by weavers' wages (since the wage is fixed so that the weaver of an average quantity of cloth may earn a certain amount) to a much more pure measurement of effort by bonus earnings in one business, where a man who does a job in less time than is allowed gets the full value of the time saved. Where records of effort-rating, based on strict time-study, are kept for the purpose of establishing piece-rates, such records do make it possible to provide an index of effort.

Witnesses from several of the big firms were enthusiasts for piece-rate or bonus wages based upon time-study for all work involving the repetition of manual processes, and even where piece-rate wages were not paid it was emphasized how useful time-study was as a basis for measuring effort. Systems of wage-fixing based upon this technique are explicitly related to estimates of the effort required for a given task; they result in assessments of the output to be expected at a given standard of effort, subject to allowances for fatigue, for time lost through tools going wrong, &c. In the fixing of the actual wage it is usual for some allowance to be incorporated which represents in effect the wage policy of the employer.¹ There was some evidence that the precise connexion between piece-rates and the underlying effort may have become rather loose in this way, the policy allowances changing in order to recognize the fact of a seller's market for labour. This does not affect the possibility of measuring the actual effort which is being currently employed—i.e. apart from any allowances which may be added into the actual wage—in terms of a standard, even though the basic elements in the assessment come from the judgements of time-study engineers.

A Fair Day's Pay, by J. J. Gracie, describes the technique of time-study, to give a speed-and-effort rating. On this rating, 60 is a figure used to indicate normal effort, which represents the amount of energy used by an average man when performing such a task as walking at three miles an hour. The 100 figure can be taken as representing the full-out capacity of the average man. An 80, to quote Mr. Gracie, 'is not an exceptional performance. It is a reasonable speed, maintained all day under a fair incentive', which, as Mr. Gracie goes on to point out, means that he will work faster at times during the day. To say then that a group of people is working at a pace of 40 or 60, for example, gives a measurement of work effort in a period of time, unaffected by changes in the nature of the product or in the machinery, which will affect output.

The question of piece-rates as such and their use as an incentive is discussed later on (p. 219).

2. *How has productivity varied in your business during the inter-war period and since? What do you consider the main reasons?*

(a) *The inter-war period.* Most witnesses were interested in discussing the contemporary situation. Those who did refer to the inter-war period often merely said that productivity was 'satisfactory' or 'had not varied very much'. More definite answers related it to changes in technique or to the labour situation. Thus No. 6 (chemical engineers, small) mentioned

¹ See interim report on 'Measurement of Productivity', issued by the Joint Committee of the Institution of Production Engineers and the Institute of Cost and Works Accountants.

that productivity in the making of castings had been gradually but most prejudicially affected during the inter-war period because of the decline in the number of apprentices entering the trade. No. 8 (textiles, medium) had found that productivity had risen sharply with the introduction of the warp-stop motion on the looms. No. 14 (mechanical engineer, medium) said the trend of productivity was steadily upwards, due to improvements both in machine tools and in the class of labour attracted since the introduction of their bonus system after the 1914-18 War.

Several other witnesses related changes in productivity to changes in general trade conditions. No. 17 (metal products, large) said specifically: 'During the inter-war period output per man increased in times of depression and decreased in prosperous years.' No. 5 (printing and paper products, small) pointed out that in the late 1920's and early 1930's they always had a good order book in contrast to the cotton firms in their district; so they had a waiting list for employment, and the workpeople were anxious to keep their jobs and worked very hard. On the other hand, two witnesses from large engineering firms said that a lower volume of work led to a sharing out of what there was so that production per man was less in bad times.

(b) *The post-war period.* The evidence is summarized in Table I. In some cases our witnesses drew a distinction between what had happened during and immediately after the end of the war and what was true at the time of their seeing us in 1947-9. Two different influences may be distinguished. On the one side several witnesses said that productivity had fallen heavily, reaching a low about 1946 when conditions of living were rather bad and when labour was relatively unskilled for peace-time work and uninterested, but that it had come up gradually since then. On the other side were those businesses who had been helped by the compulsory standardization and simplification of their product imposed during the war and maintained afterwards. This applied to several engineering and textile firms.

When discussing the first question, a distinction was drawn between productivity in the sense of effort, and productivity in the sense simply of output, per man. The same distinction is observed here, although labour effort was referred to specifically under a later head (p. 213).

From Table I it appears that in only 2½¹ cases was labour effort thought to be better than before the war, and in 9 cases it was thought to be the same. New piece-rate systems had recently been introduced in the two clear cases where the witnesses said the standard of effort was better. Where a distinction was drawn between classes of labour it was to point out that older skilled men and those on piece-work were working satis-

¹ The notes on Table I explain the way in which these totals are reached.

TABLE I

The Trend of Productivity compared with before the War

Note: The following symbols are used:

+ Productivity up as compared with before the war.
 — " down " " " " "
 O " the same " " " " "

The two meanings of productivity are distinguished.

The order is that in which the witnesses were interviewed. The evidence refers to the years 1947-9 unless another year is specifically noted.

The letters S, M, L indicate the size group of the business, but there is no evidence that this is correlated here with productivity—the type of product and make-up of the labour force seem much more important.

<i>Size class</i>	<i>Output per man-hour</i>	<i>Effort of workpeople</i>	<i>Reasons for change</i>
<i>1947</i>			
A. L	O	O	Productivity up on particular operations because of new piece-rates, more modern plant. On average no change because sub-marginal workers pulled down average.
B. M	+	+	Introduction of piece-rates; decreased variety and quality; increased proportion of male labour.
C. L	— 30-40%	—	Skilled men fewer and older; drop in <i>esprit de corps</i> .
D. S	—	—	Tradesmen older.
E. M	—	O or +	Shortage of component parts.
F. S	—	..	Shorter runs.
G. L	+ factory a — factory b	O —	(a) Some alteration in methods; straight piece-work. (b) Output more diverse; material shortages.
H. L	+ factory a + by large % foundry b	O +	(a) Some improvement in method. (b) Introduction of new piece-rate system and changes in methods.
I. M	O	— 25%	Steadier work; introduction of departmental instead of team system.
<i>1948</i>			
J. M	—	—	Main incentive gone since fear of unemployment gone.
K. S	Not known	O	..
L. L	— definitely	— 10%	Uneven flow of materials; workpeople affected by lack of proper food and bad social attitude.
M. M	+ 6-18% in all depts. except one where --	O	Redeployment.

TABLE I (cont.)

<i>Size class</i>	<i>Output per man-hour</i>	<i>Effort of workpeople</i>	<i>Reasons for change</i>
<i>1948 (cont.)</i>			
N. L	— 20-25%	—	Restrictive practices introduced by labour.
O. M	O	O or —	Effort and productivity low in war and just after because of loss of skilled men and bottlenecks in supplies; now being made up.
<i>1949</i>			
P. L	— on hand press (by 50% 1946, but now not by much) + overall, by 50-100%	— O	Loss efficient labour, but increase in semi-automatic production at expense of hand; greater standardization.
Q. L	..	O piece-work-ers — time-work-ers	The low was reached in 1946, bad conditions, untrained and uninterested labour. Piece-workers since come up to pre-war standard.
R. S and S.	—	O skilled and older work-ers — semi-skilled and younger	Great fall during war, when dilution, reduced quantities, inferior materials. Trade still heavily controlled. Skilled and older men now back to pre-war standard, but not others.
T. S	+ but quality not so good	..	More standardized production.
U. L	+ 12-15%	O	Improved methods. Effort fell off at end of war, but now same as pre-war.
TOTALS*	+ 7½ — 10½ O 3	+ 2½ — 9½ O 9	

* These totals are intended to give a weighted impression of the table as a whole and for this purpose an answer such as 'O or —' has been counted as $\frac{1}{2}$ to each; where two factories have been distinguished their marks have been added separately; where two classes of workpeople have been distinguished each has been counted as $\frac{1}{2}$ in the appropriate total. (It should be noted that this last procedure weakens the effect of the businessmen which reported 'O' and '—'; it might be argued that in this case a '—' gives a more valid summary.)

factorily, but that the effort of the younger men, the semi-skilled, and the time-workers had fallen.

In 9½ cases it was thought that labour effort had fallen generally, though to very different degrees. The comment here is usually on the age, skill, or quality of the labour force. In some cases psychological causes are adduced, most frequently a change in the attitude of labour with the end

of the fear of unemployment, and one witness stressed a change in attitude amounting to restrictive practices. The remaining business in this class, which records a fall in effort of 25 per cent., had turned over to a more steady system of production, and did not expect the effort that it got at the forced pace of pre-war seasonal peaks.

As regards output, as distinct from effort, per man-hour, in 3 cases it was thought to be the same and in 7½ cases higher than pre-war. The main reasons for higher output are summarized in the Table—improved methods, including the introduction of piece-rate systems, better plant and greater standardization, the latter factor sometimes counterbalancing an actual fall in effort. Where output had fallen (in 10½ cases or 50 per cent. of the total) two early witnesses ascribed it, at least in part, to material shortages holding up the flow of work, but the usual reason was that effort had fallen.

II. EQUIPMENT AND METHODS OF PRODUCTION

This is a key factor when considering productivity in the sense of output per man-hour. In discussing this, we had in mind the often voiced criticism that our practice, in this respect, is inferior to general American practice. The first question we asked was a factual one:

3. *What changes in methods of production have been introduced in your business within your experience?*

The experience of some of our witnesses went back some 30 years or more, but in the main they picked out the most recent or the most revolutionary changes in the inter-war years. Some changes were revolutions in technique, such as the development of welding in place of riveting and casting, the development of machine composition in book printing, the use of infra-red drying, and the great improvement in the quality of materials, such as steel and tinplate. The other group of changes mentioned was the tendency towards more automatic processes—the change from batch to flow-line production, the great developments in tooling, automatic feeding, &c.

It is worth noting specifically that the mechanization of small hand tools, such as screw-drivers, which has been fairly recent, can increase productivity greatly in assembly processes.

The best firms in this country are often claimed to be as good as the best in other countries, and a number of our witnesses stated that they did not think they had lagged behind America in mechanization in the main production departments; though differences in the scale of the market limited the opportunities for mass production and made some American machinery unsuitable to this country.

When reviewing this evidence it has to be remembered that war-time

circumstances have prevented British businesses in some industries from keeping as up to date, as compared with the U.S.A., as they might have hoped to do pre-war. Post-war, too, the scarcity of much new equipment has had its effect—though, again, mainly on the non-engineering industries. On the other hand, with the E.P.T. rebate, easy money, and high gross profits, many businesses were purchasing new equipment at a much greater rate than in the inter-war years.

Informed comment often suggests that the main ground for criticism of British businesses is their relative backwardness in the ancillary processes and the handling of material, where American industry appears to have mechanized more fully. Our evidence suggests that there is, or has been, a good deal of truth in this criticism but that the situation is now changing. There were several comments on the importance of recent developments in power-driven trolleys, stacking trucks, &c. These seem peculiarly suited to British conditions, where economy must very often be combined with great flexibility in production, and where the conveyor belt often means too great a rigidity.

We did not concern ourselves with the possibility of improved methods in clerical work, &c., though one of our witnesses had applied the methods of 'job-evaluation' in the office as well as in the factory and had instituted a system of payment by results within grades of responsibility. It would certainly have been very difficult to get any clear impression of changes in relative efficiency so far as this type of labour is concerned. But in view of the general tendency to concentrate upon efficiency in manufacture, it is worth stressing this omission. Efficiency in manufacture may sometimes be at the expense of efficiency outside manufacturing industry (as Professor Jewkes has argued in the case of America).¹ But the authors also believe that efficiency within industry must be influenced and limited to some extent by the standards of efficiency prevailing outside—the pace set in shops and commercial offices, central and local governments, &c. Relative inefficiency here will have two effects; besides the obvious one of causing more man-power to be required outside manufacturing industry, a relatively lower working pace here must limit the pace that can be obtained in similar jobs in manufacture.

4. *How do you decide when to introduce a piece of improved equipment? When the decision is negative, has this been due to: (a) Insecurity of future; (b) Lack of finance; (c) Taxation; (d) Insufficient scale of output or insufficient size of individual runs; (e) Resistance of labour to changes in working practices?*

The first and more general part of this question is, it must be admitted, very difficult to answer. One business man on seeing the question said

¹ Cf. the *Manchester School*, January 1946, 'Is British industry inefficient?'

that in this connexion he was always hoping to find an economist who would tell him just why he did what he did, and that he certainly had no hope of discovering any systematic rationale for himself! The topic deserves more attention than it could be given as one of a number of questions, and the Research Group has recently embarked on a special inquiry into the factors affecting the purchase of plant and the like.

In the present case, nearly all our witnesses concentrated on the second part of the question and the specific factors with which it was concerned. Those who did, however, discuss the first part treated it mostly as a matter of cost. Thus we were told that a new machine would be expected to save at least x per cent. of the cost of the operation, or that the machine must pay for itself over a certain number of years (i.e. that the machine must save x per cent. of its own cost each year). From our evidence, the margin that is required before a machine is installed on the basis of costs varies considerably—chiefly with the nature of the machine and the likelihood of technical change or a change in products. The methods of reaching a decision vary in their basis from detailed cost-accounting calculations and rules of thumb (such as that one type of machine had to pay for itself in three years) to *ad hoc* decisions, with no definite earnings requirement.

The stress, however, was sometimes laid on non-cost factors, such as labour shortage, or the importance of getting more output from a restricted factory space, or the extent of any consequent dislocation of production, and also the effect of a generally progressive or non-progressive 'climate' in a business. An interesting point was made by a witness from a specialized machinery manufacturing firm when he said that, with them, one important motive for investment in good times was that their prime costs would generally be reduced and this would give them a greater freedom in bad years, when, if they were cheaper than their competitors, they would get what work there was.

The summary of the answers to the detailed part of the question, given in Table II, confirms the pre-war findings of the Research Group that finance, as such, was a minor matter, subject to a preference to expand out of one's own resources. Our witnesses were nearly all from old-established firms and most had been able to provide finance of their own.

Finance, of course, is not independent of taxation. Most businesses said that taxation had not affected their decisions. Of the affirmative answers, the first was from a business with a history of very rapid growth; one was thinking in general terms of the difficulty of growing out of profits, as in the past; and another of the difficulty of replacing old plant at higher prices. Only two businesses thought taxation adversely affected the purchase of particular machines, because net earnings figures looked less favourable; one of them had, because of increased taxation, shortened the

TABLE II

4. *The Introduction of Improved Equipment*

<i>Has a negative decision been due to:</i>					
<i>Size class</i>	<i>(a) Insecurity of future?</i>	<i>(b) Lack of finance?</i>	<i>(c) Taxation?</i>	<i>(d) Insufficient scale of output or insufficient size of individual runs?</i>	<i>(e) Resistance of labour to changes in working practices?</i>
<i>1947</i>					
A. L	Yes	No	No	No	No
B. M	No	No	No	Yes, set a limit	No
C. L	No	Yes	Yes	No	No
D. S	No	No	No	Yes	No
E. M	No	No	No	Yes, probably	Yes
F. M	No, except perhaps for major changes	Yes, sometimes slowed down investment	No, but weakened firm	No	No
G. S	Yes, sometimes	No	No	Yes	No
H. M	Yes	No	No	Yes	No
I. L	Yes, perhaps	Yes	No	Yes, set a limit	No
J. M	No	No	No	No	No
<i>1948</i>					
K. M	No	No	No	Yes	..
L. S	Yes	No	No	Yes	No
M. M	..	..	..	Yes, sometimes	Yes, but only isolated instances.
N. L	No	No	Yes, indirectly	Yes	Yes
O. M	No	No	No, for improvement of existing equipment Yes, for expansion of business	Yes	No
<i>1949</i>					
P. L	Yes, sometimes	No	No	..	..
Q. L	No	No	No	Yes	No
R. S	No, unless future of product uncertain	No	Yes	No	No
S. S	Yes	Yes	No	No	No
T. L	No	No	Yes, indirectly	No	No
TOTAL	Yes 7 No 12	Yes 4 No 15	Yes 4½ No 14½	Yes 12 No 7	Yes 3 No 15

period in which a machine should pay for itself if it were to be installed without question.

The only point generally thought to be important was the scale of output or size of individual runs--and this latter point was true even for the large firms, where they were multiproduct.

There was little evidence that resistance of labour to new machinery was important in preventing investment by a firm. Only 3 out of 18 who discussed this returned an affirmative answer, and only 2 felt it to be an important factor (one stressing that it was 'very important').

One business man raised the important parallel point of demarcation of tasks and attempts to keep the job in the hands of a skilled man, which often made it difficult to make a radical change in industrial practice. The problem was bound up with the history of industrial development in this country and the importance of craft unions; he thought this an important difference between America and Britain which gave American businesses definite advantages in the introduction of new practices. Our witness instanced coppersmiths, who naturally had an interest in keeping up the number of coppersmiths employed. On one process it was decided to cut off copper piping with a circular saw. The coppersmiths said this was cutting copper pipes to length and insisted on keeping the job in their hands, although it was a waste to use a fully skilled coppersmith on such work. In the same way, all electrical work was claimed for fully skilled electricians. This business had had a lot of trouble over the introduction of welding machines. Further developments were going on there; for example, at present the ends of tubes were brazed, but the newest technical development involved the application of heat by high-frequency induction--and that would bring trouble with both the coppersmiths and the electricians. This problem is really outside the control of the individual firm, part of the industrial climate and the framework within which the individual firm does the best it can.

It will be relevant to the Research Group's new inquiry that these replies suggest that the factors (a) to (e) set out in this question are not in practice of key importance in the decision to invest.

5. (a) *How far has the variety of your production been reduced as compared with before the war?* (b) *If you could reduce the variety of your output would that reduce your costs?* (c) *Do you consider that there is scope for increasing the degree of standardization in your business at the present time?*

This particular question was asked only towards the end of the inquiry, so there are only eight cases under these headings, but in the earlier question papers a related question was put: 'Should we go in more for standardization and reduction in variety of models? If so, what is stopping

us?' The conviction that British industry could go in more for standardization was found generally among the engineers who were producing goods for other businesses rather than among the producers of consumers' final products. The great and largely unnecessary variety of electric motors, by size, shape, method of attachment, and so on, was twice mentioned. But in the case of textiles the point most frequently stressed was that the variety was necessary, to serve the various markets and particularly the export market. This came out clearly in the answers to the different parts of this question: there was almost complete unanimity in saying that if variety could be reduced it would reduce costs, but the answers to (c) in several cases made this appear somewhat irrelevant. The firm (high quality textiles, small) which said 'yes' most emphatically to (b)—that it would make 'an enormous difference'—was also quite clear that (c) did not apply to it—standardization 'was not their job', although it had, during the war and immediately afterwards, benefited by the longer runs obtained on some Utility materials.

It seems that further standardization should be encouraged where it can reduce costs and where that is of primary importance, but that it should be standardization in materials, processes, and parts rather than in end products. The standardization of component parts is particularly important and without the disadvantages accompanying other forms of standardization. It would be necessary for manufacturers to co-operate in this. It is often assumed that lack of standardization is due to consumer demand, but the evidence suggests that even more important is the attitude of business men—both manufacturers and distributors—since they can achieve a considerable standardization of parts whilst leaving variety of final product. On occasion tribute was paid to the effect of such standards as had been developed, but it was felt that not nearly enough use was made of them. The trouble often went back to the drawing-office of the customer-manufacturer and there was scope for increased persuasion and education here. In some cases, also, too many standards had been allowed to develop, thus removing some of the economy of standardization.

6. *Do you consider that there is adequate research in the processes with which you are concerned? Have you satisfactory access to the results of it?*

A 'yes/no' summary of the answers is given in Table III. Not all have specifically answered the second part of the question, but in every case where they have, they record satisfactory access to what results are available. There was less unanimity on the usefulness of these results. On the whole those firms who do their own research seem to find it the most satisfactory. It was clear that some research associations have some way

TABLE III

6. *Research and its Availability*

<i>Size class</i>	<i>Is there adequate research in the processes with which you are concerned?</i>	<i>Have you satisfactory access to the results of it?</i>
<i>1947</i>		
A. L	Yes	Yes
B. M	Yes	Yes
C. L	No	Yes
D. S	Yes	Yes
E. M	No	Yes
F. M	Yes (own research)	..
G. S	Yes	..
H. M	No	Yes
I. L	Yes (own research)	..
J. M	No	..
<i>1948</i>		
K. M	No, but developing	..
L. S	No	..
M. L	Yes (own research)	..
N. M	Yes	..
O. L	No	Yes
P. M	Yes (own research)	..
<i>1949</i>		
Q. L	Yes (own research)	..
R. L	Yes	Yes
S. S	Yes (own research)	Yes
T. S	Yes	Yes
U. S	No (too small)	..
V. L	Yes (own research)	Yes
TOTAL	Yes 14; No 8	

to go before their industry will consider them indispensable. An outstanding exception appears to be the Shirley Institute. The small chemical engineering producer said that the training given to his managers by his Research Association had greatly facilitated their using the research. The Shirley Institute also provides this service of training for managers. This seems to be an important development, and not only for small businesses. One witness from a large engineering firm said that, while they had satisfactory access to research results, they could not always assimilate all the knowledge handed to them, because they had not got a sufficiently large or sufficiently specialized staff.

The amount of research that can be done by individual firms depends, of course, on their size. One of the smallest textile firms said they had been helped considerably on occasion by the research institute, but they

felt the need for research on day-to-day problems, and were too small to afford it. Other firms had their own chemist or testing laboratories and relied on outside organizations for more fundamental work. At the other end, our largest firm did its own fundamental research, market research and advice, day-to-day research and testing for their customers, had developed joint research with a big customer, and had a complete reciprocal arrangement with an American company for the use of patents and know-how. Several of the smaller firms evidently get considerable help from the research done by their larger suppliers—particularly when it is a case of the tested quality of raw materials. One business man supplying other manufacturers also mentioned the importance of getting a customer to tell you not what he wanted but the job he wanted done, and there is evidently considerable scope for costs being reduced in this way, just as it is now generally realized that there must be the closest co-operation between the production and sales and design staff within one big firm.

There seemed to be an undercurrent of opinion that the field for research was almost unlimited, and that since resources to do it were not unlimited, it might never be considered 'adequate'. It was generally agreed that there should be more and better organized research. One complaint was that research in this country was almost entirely theoretical and long-run, while applied research lagged relatively behind. This connects with the opinion, expressed several times, that there was most scope for the individual firm to do its own research. It seemed to be felt that collective research, although necessary, was not sufficiently linked with the problems of particular manufacturers. As one of our witnesses said: 'Often they have no idea of the urgency of the problem, or of doing it quickly, and there is not enough drive in that sort of organization.' We should record, however, that research associations were expected to be better in the future, as a result of the greater interest taken in them since the war.

It seems worth calling special attention to one witness's suggestion for a pilot factory run by a research association, which seems to have a wide possible field of application. In this connexion, the same witness stressed such matters as the lighting of the work-bench, where each business was still groping empirically into the value and precise use of newer lighting devices.

Another point of general relevance is the increasing importance of the physicist, who is beginning to replace the empirical engineer in industry. A parallel point was made by two witnesses who complained that the government was now creaming off the best scientists so that they did not get into industry. (It was also felt that too often the jobs that specialists taken from industry were doing for the government were not sufficiently worth while to justify their remoteness from manufacturing processes.)

7. *Has the rise in wages in your industry led to alteration in your methods of production?*

This question was only introduced in the final draft of the question paper, so there are only seven answers to it, which are summarized in Table IV. On the whole the evidence is surprisingly negative on this point. The general trend towards a higher degree of mechanization, which most of our witnesses reported, appears to have been independent of rising wages. There is only one decisively affirmative answer to this question (D in Table IV, a large firm in the Midlands); this witness said that the whole basis now was to try to save labour costs, and it had encouraged mechanized handling, &c. Another (F, a small textile concern) agreed that the rise in wages had led to alteration in methods of production, but at least part of the reason was the shortage of labour as distinct from its cost. This was also the reason given by another firm for the introduction of automatic looms, not to show a saving in price, but because the labour was 'not there'.

TABLE IV
7. *Whether the Rise in Wages has led to Alteration
in Methods of Production*

Size class					
1948					
A.	L	.	.	.	No
B.	M	.	.	.	No
1949					
C.	L	.	.	.	No
D.	L	.	.	.	Yes
E.	S	.	.	.	No
F.	S	.	.	.	Yes
G.	L	.	.	.	No
TOTAL		Yes 2; No 5			

III. THE ENERGY AND WILLINGNESS OF MEN AND MANAGERS

Having considered equipment we then went on to consider the spirit in which that equipment was used, and the emphasis shifted to the individual workman's effort. To some extent also we considered the framework of organization of the business, but it is not very rewarding to ask a manager about his own efficiency, so, in the final version of the question paper, we asked questions only about operative and executive labour, and not about top management.

8. *Has there, in your experience, been any marked change in the energy and willingness of the wage-earner?*

A summary of the answers to this question is given in Table V, and should be compared with the answers to question 2 summarized in Table I.

TABLE V

8. *Whether there has been a Fall in the Energy and Willingness of the Wage-earner*

<i>Size class</i>	<i>Generally</i>	<i>Energy</i>	<i>Willingness</i>
<i>1947</i>			
A. L	No, but labour less efficient	..	..
B. M	No	..	..
C. L	Yes	Yes, due to food and conditions	Yes, but not fallen so much as energy
D. S	{ Yes, new and young recruits No, pre-war men	..	..
E. M	Yes	..	Yes
F. M	No	..	No, labour force reduced since war and only kept best workers
G. S	Yes, marked decline	..	..
H. L	Yes	..	..
I. M	Has <i>increased</i>	..	..
J. L	Yes	..	Yes
K. M	Now firm gave continuous employment it did not expect so much effort as at peak in pre-war seasonal trade		
<i>1948</i>			
L. M	Yes	..	..
M. S	No	No	No.
N. L	Yes, due to social attitude	..	..
O. L	Yes	Yes, due to inadequate food	Yes, due to effects of propaganda
P. M	No, or perhaps improved	..	..
Q. L	Yes	..	..
R. M	Yes	Yes	..
<i>1949</i>			
S. L	Yes	..	..
T. L	Yes	..	..
U. S	{ Yes No, skilled and older workers	..	Yes
V. S	{ Yes No, skilled and older workers	..	Yes
W. S	Yes, and quality down	..	..
X. L	No, constant	..	..

TOTAL* Energy and willingness in general:
 deteriorated $14\frac{1}{2}$ (excluding K)
 constant $7\frac{1}{2}$
 increased 1 (or perhaps 2) } $8\frac{1}{2}$

* Where firms distinguish classes of workpeople, each class is counted as $\frac{1}{2}$.

The form of this question is more direct than the former, and the witnesses come out more positively on balance that there *has* been a clear fall in the energy and willingness of the wage-earner. It is partly that more have answered this question than answered the former one in terms of 'effort'; partly that some who, before, thought effort was constant or perhaps had fallen now come out definitely for a fall; while only one or perhaps two thought effort had increased.

The comments given in some cases relieve the blackness of the picture. Thus firm A (an engineering firm in the Midlands) pointed out that its industry had been bringing in and employing people whom it would not have employed before; for example, in one occupation, the Employment Exchange had never had more than two women on the register—'one was mentally defective and the other lacked a leg'. Thus, though there had been no marked change in the energy and willingness of the wage-earner, the available labour was, in fact, of a less efficient kind. Firm C (a large firm in southern England) thought that both had fallen, but willingness not as much as energy. It was stressed that there had been a considerable fall in *energy* right through the factory, including brain workers. The witness thought it was due to living conditions and inadequate food, and also because the big social changes which were taking place had meant that men's energies were divided. The factory had grown in size very rapidly during the war, and that had necessarily brought difficulties.

Firm D (small firm, north of England) was the first to draw a distinction between different classes of workers. They found their pre-war men as good as ever, but they had been unable to obtain equal quality in recruits. A good many had had big wages in the war and were 'seeking 1945's lost Paradise'. There was a shortage of juveniles so they had had to take on everyone available; the under-thirties were less energetic and willing than the others and, also, younger people did a good deal of chopping and changing of jobs. This point was also stressed by firms U and V (again, both in the north of England). In both businesses the skilled workers and the older workers were working well but the younger semi-skilled showed unwillingness and lack of interest, with none of the old sense of loyalty to the firm, of comradeship with their mates, or of craftsmanship on the job. Firm W (textiles) thought the work of power-loom weavers had deteriorated much more than that of hand-loom weavers—and the former would include the younger and less skilled workers.

There was general evidence that labour turnover was much bigger than before the war, and it was mentioned as particularly affecting young female labour in the newer industrial areas around London. Several replies provide evidence that the expected interruption of National Service, so far as boys are concerned, has a very unsettling effect on the 16-18-year-olds.

During the first half of the inquiry, shortage of material supplies was mentioned as affecting the attitude of the workpeople. Thus firms G and J thought it had a discouraging effect. Firm F (engineering), however, said that a drastic shortage of supplies had caused the position to improve compared with two years previously—they could work only one shift, so had reduced the labour force and retained only the best workers. Two or three witnesses mentioned the absence of unemployment as having an adverse effect on productivity, and two mentioned the burden of direct taxation, but this is dealt with specifically in question 9, and that may in itself have stopped more people from referring to it here. This also applies to any comments on the workpeople's general social attitude, which was particularly stressed by firm N (a large engineering concern). This witness said that workpeople were steeped in propaganda about private profits, &c., and there seemed to be a feeling that now was the time to soak the management. Discipline was not nearly as good as before the war, and there was a tendency for workers to extend tea-breaks and to start and stop when they liked. These comments were made by a manager with a good reputation for his sympathetic attitude to labour and for the relatively good quality of his relations with his workpeople. A number of other witnesses showed themselves disturbed by a change in the attitude to management on the part of their workpeople.

Firms reporting deterioration in effort gave varying reasons, but they were all in areas where the labour supply was particularly short. Those unaffected stressed enlightened management and their reputation as good employers, but obviously other factors came in. Our evidence did not suggest that the problem was confined mainly to one size of firm—nor that the situation was less serious in 1949 than it was in 1947. Very often, however, it was only certain sections of the labour force that were lacking in energy and willingness and it is perhaps the same 'irresponsible fringe' which is making labour turnover so high. Moreover, with the high labour turnover, the call-up at 18, pressure for output, &c., some firms have cut training time, and decline in quality may be due to this sort of factor as much as to lack of 'willingness'.

9. *In your experience, has output been affected by: (a) The attitude induced during the inter-war years by fear of unemployment; (b) The effects on personal attitudes of the current labour shortage; (c) Restrictive labour practices; (d) General social attitude—e.g. a man's feeling that he has no interest in making money for other people; (e) Direct taxation of wages; (f) The quality of leadership given by supervisory grades; (g) Discontent with factory conditions?*

These reasons for a fall in productivity were already mentioned, among

others, under question 8, but this question tried to get some idea of their importance. Table VI summarizes the answers. It will be noticed that (f)—the quality of the leadership given by supervisory grades—is omitted, since it proved difficult to get an adequate discussion of this factor. In Table VI the answer 'Yes' means that output has been thought to be adversely affected by the consideration mentioned.

TABLE VI

The Effect on Output of Background Factors on the Labour Side

9. Has output been affected by:						
Size class	(a) Fear of unemployment ^a	(b) Effects on personal attitudes of the current labour shortage ^a	(c) Restrictive labour practices ^a	(d) General social attitude ^a	(e) Direct taxation of wages ^a	(f) Discontent with factory conditions ^a
1947						
A. L	No	Perhaps	Perhaps	No	Yes	No
B. M	Yes	Perhaps	No	Yes	Yes	No
C. L	..	Yes	No	Yes	Yes	No
D. S	No	Yes	Perhaps	No	Yes	No
E. M	Yes	Yes	Yes	No	Yes	Yes
F. M	Perhaps	No	Yes	No	Yes	No
G. S	Perhaps	Yes	Yes	Yes	Yes	No
H. L	Yes	Perhaps	Yes	Perhaps	Yes	No
I. L	No	Yes	..	No	Yes	..
J. M	No	Perhaps	No	No	No	No
1948						
K. M	Perhaps	Perhaps	Perhaps	No	Yes	No
L. S	No	No	No	No	No	No
M. L	..	Yes	Yes	Yes	Yes	..
N. L	Yes	..	..	Yes	..	No
O. M	Perhaps	Perhaps	Perhaps	Yes	Not now	No
P. L	No	Perhaps	Yes	Yes	Perhaps	No
Q. M	No	Perhaps	No	No	Perhaps	No
1949						
R. L	No	..	No	Perhaps	Yes	No
S. L	..	Yes	Yes	No	Yes	No
T. S	No	Yes	Perhaps (minor)	No	Not now	No
U. S	..	..	..	No	Yes	..
TOTAL*						
Yes	6	12	9½	8	15	1
No	9	2	6	12	4	17

* Counting 'perhaps' as half 'yes'.

Witnesses generally had not found discontent with factory conditions to any important extent. The general opinion seemed to be that output would be affected only if conditions were shockingly bad. Most of our

witnesses came from firms where conditions were very good, or at least no worse than the industry as a whole. The one affirmative answer (from a linen manufacturer in Northern Ireland) emphasized the effect of falling behind the standards in its area. The linen industry had not been given assistance, by supplies or finance, to modernize and so was at a disadvantage compared with new-comers to the area who had been helped by the government as part of the policy of attracting new industry.

The majority of businesses did not think that general social attitude (*d*) had affected output. Some pointed out that the main interest of a worker was what he got for doing a particular job, so that, even though they would agree that such a general attitude was prevalent, they did not agree that it affected the individual man's work. It was in the big firms particularly that management thought that it had had some effect. These witnesses appeared to be very worried about the attitude of workers and found it difficult to know what to do about it. The attitude was thought to have political origins outside the works and to be, to some extent, independent of conditions inside. Some firms were trying to combat it by issuing information booklets on the work of the firm, and by using joint consultation machinery to discuss the financial position, profits, &c.

Factors (*a*) and (*b*) are complementary, the former referring to the effect of pre-war unemployment and the latter to the effect of the labour shortage which has actually existed since the war. Although it will be seen that most businesses gave a negative answer to (*a*), a substantial number thought the inter-war experience was still remembered and was an influence on the present. The possibly two-edged effect of fear of unemployment—on the one hand the keenness of the individual worker to keep his job, and on the other the urge to spread the limited work—has been referred to on p. 202. The second factor, of course, is the normal explanation of the existence of restrictive labour practices, and many witnesses linked (*a*) and (*c*) together explicitly.

The attitude of some trade unions to time-study was particularly mentioned and also the fact that unions frequently did nothing to stop restrictive practices which had grown up but which might not have been deliberately organized by the trade unions. Restrictive practices, of course, have a particular effect upon the fixing of piece-rates. It will be realized that they tend to make piece-rates 'loose', in the sense explained on p. 201, and thus may give an actual incentive to the men to maintain too low a rate of effort in case the rate should be 'bust'. Although a majority of our witnesses were convinced of the existence and importance of restrictive practices, a number stressed how difficult it was to make a rational assessment of their effect.

The contemporary labour shortage (*b*) was generally seen as inducing

workers to take things more easily and as leading to greater turnover of labour and absenteeism, especially in the case of women; but its full effect was thought to be modified by the fear that the situation of over-employment would not last. P.A.Y.E. (e) was also stressed as being important, though less so by the later witnesses; in general, it was thought to have had an important effect on the willingness to work overtime or Saturday mornings. When tax at the full rate of 9s. in the £ fell on relatively low earnings, men had a good idea when they would run into this full rate and tended to slacken off at this point. The more recent adjustments in taxation allowances seem to have removed these particular deterrent effects, but the general weight of taxation, combined with the fact that there was, for some time, little to be bought in the shops, was thought to have had a dampening effect.¹ A number of witnesses thought that, behind the workers' attitude, was a feeling that they should not pay direct taxation at all, however it was collected.

Quite apart from the effect of taxation on men, several witnesses raised the point that girls in their districts seemed to have a fixed amount they wanted to earn—£3 or £3. 10s. a week was mentioned several times—and when they had earned that they preferred to go home.

10. *What value do you attach to particular forms of wage payment—e.g. piece-rates, individual bonus, collective bonus—as incentives?*

There was general agreement that to get labour to make its best effort payment should be by results. Where quality was important, and controlled by the worker, this was thought to carry the defect of leading to inferior and scamped work. One of the businesses in the printing, &c., industries reported that it had, a long time before, made an experiment with piece-rates; those had had that effect and a reversal to day-work had improved quality. Others said that delicate jobs, inspection, &c., had to be paid for on a time basis. Only one firm recorded with satisfaction that they were entirely on time-rates, but the explanation here was that their fully automatic machinery controlled workers' outputs and they were trying increasingly to eliminate the influence of the human factor. Others recorded with regret that they were unable to introduce any form of payment by results because the firm was too small or the work was unsuitable. One factory of one firm was running without any money incentives and doing as well as the other factories which had such incentives, but our witness believed this to be only temporary and due to the special circumstances that the factory was a new one in a development area and the men

¹ A parallel point, that some of the goods of most interest to the worker cost him considerably more in marginal effort in this country than in the U.S.A., is made by an Anglo-American Productivity Council team (cf. the *Observer*, 8 January 1950).

were having a personal interest taken in them by the management. He thought that productivity would fall later unless the human interest was continually re-stimulated.

By far the greater number of our witnesses were in favour of straight piece-rates and of as individual a system as possible. The more directly and quickly the payment could be related to output the better, and a good piece-rate system therefore had to be simple. If it were not simple it was no use its being perfectly fair, and so long as it was simple it was effective even if it were slightly inequitable.

Most favoured a collective bonus scheme only when an individual incentive scheme was unworkable. Some recorded failure with collective bonuses ; and one firm giving a quality bonus to weavers found that it came to be expected as of right and could not be withheld unless the work was outstandingly bad, so that it lost its incentive effect. Collective bonuses seem to be most successful when applied to a small number—the bigger the group the less incentive. Two firms (both engineering, one large and one small) had found them to be necessary when production was on a flow-line basis and a collective effort was wanted from workers organized in groups. When such a team was working on a conveyor belt a collective bonus gave an incentive to those with an easy job to help with any hold-ups. Another witness favoured collective bonuses, on the grounds that they saved the management hours of headaches sharing out the most profitable jobs amongst individuals.

An important effect of a piece-work system, apart from the incentive it gives, is to cause the management to review the organization of the work. It was pointed out more than once that the introduction or revision of piece-rates was nearly always accompanied by other things which would themselves affect productivity—a new effort has to be made to secure the co-operation of labour, new machinery or methods may well be introduced, and so on. The actual fixing of piece-rates in the first place focuses attention on the volume of output. Later, piece-work earnings, inspected regularly by the management, give a guide to any hold-ups. If there is a minimum fall-back rate (which has to be paid whatever the strict piece-work earnings) the management have a direct incentive to smooth the flow of work, or, in other cases, the workers themselves will complain if they cannot 'earn their money'.

The essence of fixing piece-rates is to give an agreed minimum over the normal day-rate earnings for the same class of labour. They must therefore be based on some estimate of 'average' performance. Those firms who had experience of time-study stressed that measurement of effort based upon time-study provided the most accurate basis for rate-fixing. It had been found possible for trained men to reach a fair measure of agreement,

and the adoption of such a method of assessment had made less likely serious anomalies in earnings of labour of the same class, making the same effort.

One of the main objections of the workers in the past to any system of piece-rate payment has been the fear that an employer would cut rates if workers earned too much ; so it has become a general rule that a rate once fixed should not be changed unless the nature of the job changes. Thus, it is essential not to be too quick to fix a rate, for it is normal for output to increase greatly in a short time, as the worker becomes used to the job, and as any small but important adjustments in methods are introduced. If a rate turns out to have been fixed loosely, either a worker will not put out as much effort as could reasonably be expected of him, or he will get a much greater bonus than was allowed for. Loose rate-fixing, therefore, leads to anomalies within a factory, can cause great discontent between different workers and may, then, even act as a disincentive.

Regarded purely as an effective incentive, our evidence was that a straight piece-work price, fairly based on work measurement, will probably obtain the highest output. The abuses of such systems which may have occurred, and which certainly are believed to have occurred, should in time come to be thought of merely as old and bad history, together with the 'pace maker' and the 'sweating system'. In general, the case for a wider application of time-study and scientific methods of rate-fixing seems unanswerable, and it is gradually winning acceptance, although the attitude of British trade unions differs and is sometimes inconsistent. We have had experiments reported to us in which the trade unions have begun to supervise the settlement of such wages on a time-study basis, their representatives being trained in the rate-fixing departments of the particular firms. One reason for commending this development is that it does keep the trade unions in their old central position when wages are being fixed and so should do much to overcome their objections to time-study.

11. *Other considerations raised.*

The Question Paper ended with a general question asking if there was any consideration not previously raised to which the business man would like to draw attention. This was intended to enable our witnesses to bring out any points of interest to them, whether relevant or not to the previous questions, strictly interpreted. This final section of our paper will deal only with matters of general interest and exclude those relevant only to peculiarities of individual businesses.

It will be convenient at the same time to incorporate answers that were made to some questions concerned with aspects of management which were included in earlier versions of the Question Paper. These were

answered only in general terms, and the most important general points came up again at later interviews in replies to question 11.

With reference to the quality of British management, there was a general readiness to agree that there was not enough 'drive', and that this quality was more obviously present in U.S. industry. At the same time several witnesses with experience of American business thought it relevant to mention that there seemed in the U.S. to be a corresponding lack of other things—concern for quality, and the trouble taken over working conditions and safety were the chief things mentioned. It would appear that most of the business men who gave evidence on this point did not think that it was associated with a lack of vigour in competition, in so far as their industry had been sufficiently competitive before the war to provide an inducement for 'drive'; although one business man, referring to the higher productivity in the U.S.A., said that there was much more pressure on business there and it operated in a selective manner. Many seemed to regret the softening influence of the sellers' market which prevailed during the greater part of our inquiry.

It is interesting that only two witnesses thought that there was anything in the suggestion that a deficiency of present drive resulted from 'an administrative attitude to business, consequent on the growth of large-scale business and government regulation'. One of these was obviously answering in general terms, while the other, a large firm, had had a troubled management history which did not result from its size as such. But despite this, it is our opinion that some of the largest businesses had *at some time* suffered from the administrative attitude to which the question referred, if we are to judge from particular instances of management difficulties and inefficiencies.

There was a general unwillingness to admit that any diminution of personal incentive through, for example, heavy taxation, would have any effect upon the energy of *established* managers. Management was seen in terms of leadership, of an interest in the job—particularly when that job consisted of running a business that one had developed—and it was stated that in some businesses the people in the next to the highest grade of management were working too hard in coping with the difficulties of the post-war situation, without enough time and leisure to look around. One man pointed out that the absence of personal amenities, which were available pre-war, had also diminished the extent to which constructive leisure was available.

On the other hand, there was some feeling that the present situation, especially with regard to personal taxation, might have a very bad effect in the long run, generally through prejudicing the establishment of new enterprises and the vigorous growth of the small man which is necessary

for a healthy society, and particularly through the effect on the younger men to whom the next generation would have to look for managers. One witness, for instance, said that for such younger men the old environment of management incentive had gone; the weight of taxation would affect their keenness to work up to positions which carried much greater responsibility but not very greatly increased rewards, as compared with the intermediate positions that could fairly easily be obtained, and held.

Several of our witnesses specifically linked lack of 'drive' with the fact of government controls, and instanced preoccupations with regulations and scarcities as important factors checking it at the time that they spoke.

Early witnesses were also asked about training for management. The opinion was quite firmly held that the ideal training for management at the lower level was within the business. As a corollary to this, for lower management it was the general principle of our witnesses that they should promote from within the organization itself. One business man raised what he thought to be an important general point, that it was often very difficult to get the best type of workpeople to take the responsibility of promotion. This was especially serious in the case of women. At the time, the Ministry of Labour's Training Within Industry scheme for supervisors, &c., had not been going very long, and many business men had clearly not had experience of it. Of those who had only one was not impressed—he thought it had little relevance to actual conditions in industry, and that it encouraged the wrong attitude of mind to focus attention on improving methods of production at the stage of production, which was too late. Production tooling was expensive, and it was usually cheaper to put up with mistakes once the work had reached the production line. On the whole, however, those who had tried T.W.I. approved of it, and thought it a useful stimulus to managerial efficiency at the lower levels.

So far as 'scientific management', 'Taylorism', &c., were concerned, our witnesses were torn between a desire to support anything which might seem 'progressive', and a distrust of something which savoured to them of quackery, but only one business man seemed to have a detailed knowledge of Taylorism. One witness (from a medium-size cotton business) perhaps summed up the general attitude to these wider issues when he said that T.W.I. had led to a great improvement in industrial training, but otherwise the whole question of 'scientific management' and 'industrial psychology' boiled down to a man knowing his job and his people.

Asked specifically about the possible lack of institutions for training technicians for British industry, some witnesses suggested that we did not have sufficient facilities for the training of production engineers of the kind available in the U.S.A. and of great importance to industry. Where British industries were sufficiently localized for them to obtain the benefit

of relatively large-scale specialist institutions, these had been of great value. Correspondingly, industries which were more scattered suffered relatively and felt the lack of the training which such technical institutions give. One point which emerged was the great staffing difficulties facing such organizations in England at the present time, with the necessity of competing for good men at relatively low salary levels.

An interesting suggestion, made by a firm in the clothing industry, but applicable to any industry with a large number of small- or medium-sized firms, was for provision of outside training of employees for supervisory management in 'some sort of O.C.T.U. for the industry'. This would give successful trainees prestige and make it easier for them to acquire authority.

In this general discussion, two business men stressed the importance of the internal mobility of labour, and that the housing position was now a serious deterrent to movement. As one witness pointed out, while newcomers from away might have an unsettling effect, they tended to bring new ideas. A parallel point was made by the clothing manufacturer who said that immigrants had been of greater importance to this country than was generally realized; in his industry they made up nearer 20 per cent. than 10 per cent. of the labour force. One business man thought that the housing shortage would have a serious effect on the efficiency of younger managers, through deterring their moving around to get the wider experience which was needed in order to better themselves, and which it was traditional that they should have in many manufacturing industries.

It was inevitable that comparisons should be made with American business. On the human side, several witnesses felt that we were a good way ahead of them in labour management, but that the position was less satisfactory on the equipment side. One witness, who knew the American engineering industries well, claimed that in general British industry was very efficient compared with the U.S., but that it was in certain respects very inefficient. Our inefficiencies, he thought, were due to our tendency to concentrate on the aspects of production that were the most interesting technically, and to neglect the others, and the Americans did not make that mistake. He did not think it was a question of lack of good machinery, though there was, from several of our witnesses, an undercurrent of dissatisfaction with the design of British machinery. For many purposes American or Swiss automatic machine tools seemed to be preferred to our own.

It seemed to be felt that although we did the central job in production well, we wasted labour on frills, and tended to overstaff our machines. Several witnesses emphasized that we did not use enough horse-power per head. This again appears to be linked to the question of the quantities

being turned out, and the fact that so many British firms have developed on a multi-product basis. In some cases this clearly was a consequence of the greater importance to us of the overseas market, and the extent to which British industry had to plan in terms of flexibility was an overriding consideration.

There was a general agreement that it would be disastrous for Britain to abandon her traditional quality standards in the attempt to compete with America. When discussing this, however, there seemed to be a feeling that we were demanding standards of quality in components which were unnecessarily high in relation to the use of the final product, and that we could learn something from America here. Planning on these lines was one of the reasons for Americans getting lower costs and higher productivity.

In the discussions it became clear that nearly all the businesses that we investigated were planning considerable improvements in their equipment position as compared with before the war. If, for some, the scarcity of the right sort of new equipment was a factor holding them back at the time when they were being questioned, they had nearly all already made substantial improvements in their equipment, often with the judicious purchase on favourable terms of surplus war machinery. It was obvious that this improvement had not yet had its full effect—this often being due not to any shortcoming on the part of labour but, for example, to shortages of the right kind of material which had their effect upon the size of runs in production. When such obstacles are overcome, there should be a marked increase in output per man, quite apart from any increase in labour effort. If the productivity drive has its full effect, it would seem to follow that the output position should be considerably better than before the war. It is to be hoped that the recent marked increases in industrial output give a clear sign that the situation is changing from the uncertainties revealed in our evidence.

THE COURSE OF WAGE-RATES IN FIVE COUNTRIES, 1860-1939

By E. H. PHELPS BROWN *with* SHEILA V. HOPKINS

I. Object and Method

1. THE object of our study is to record the movements of wage-rates, with associated changes in prices and national income, in a number of countries over a long run of years, so as to establish by comparison and contrast some of the ways in which wages have been changing; and thereby throw light on the working of the labour market, and bring out problems for further study.

2. The countries we have taken are France, Germany, Sweden, the United Kingdom, and the United States. For each of these we have collected or constructed the following indexes:

- a. Money wage-rates.
- b. The wage-earner's cost of living.
- c. The price-level of final output.
- d. National income per head of the occupied population.

We also cite some records of the long-term rate of interest. To study the relations between the indexes, we have calculated the quotient of (a) divided by each of the others. The first of these quotients, $(a) \div (b)$, we may call the wage-rate in consumption units, or, according to common usage, the real wage-rate. The second quotient, $(a) \div (c)$, is the wage-rate in units of final product, or, briefly, the product wage-rate. The significance of the quotient $(a) \div (d)$ is discussed in section IV below. These indexes have been taken in two periods: 1860-1913, with base 1890-9; and 1913 or 1914 to 1939, with base 1925-9.

3. In the present paper we make our assembled material available for general use, and describe its salient features. The series are set out fully in Tables I and II, and the chief of them are illustrated in the graphs. The Appendix gives a detailed account of sources, and of the methods (and devices) we have used to combine existing indexes, or construct series from sometimes fragmentary materials.

4. Having in this way relegated the workshop to the Appendix, we shall be free in what follows to comment on what is interesting in the products, without reverting to their origins; but it is necessary first to warn all readers, of what will be very clear to such as study the Appendix, that these products are of unequal reliability. In some cases we have been able simply to take over the results of thorough and comprehensive studies: as

notably, for instance, in the wage-rates of Sweden, and the United Kingdom, and the United States from 1890, and in the national incomes of Sweden and the United Kingdom. In other cases, however, as in other national income series, we have taken over estimates which are known by their authors to be only approximate, and which we have no means of checking. In yet other cases we have made estimates of our own, from sometimes limited materials. Even with the most solidly constructed index of this kind, the result depends in part on the choice of scope and weighting, and within any chosen framework there is still some margin of error in the data: in some parts of our constructions here the risks of bias in the framework and errors in the data are considerable. It is true that we do not try to measure absolute levels, but only to compare the direction and magnitude of changes, and series may measure the size of a variable very imperfectly and yet be tolerable indexes of its rate of change. We think we have included nothing which is likely to misrepresent the course of change, as distinct from indicating it only roughly. Yet no one should use any of these materials for close figuring and inference, unless he has first satisfied himself from the Appendix that they will take the weight. In the commentary which follows we confine ourselves to marked resemblances and strong contrasts and such patterns of change as come out clearly on the evidence of many years.

5. The particular definition of two of the series requires a word of warning.

The series for money wages is made up of wage-rates and not of earnings. A main reason for this is that in the absence of wage censuses it is only the quoted hourly or weekly rate that is available. Even where we had a choice, however, we thought that the average wage-rate was nearer to our object of studying the labour market than the earnings of the average wage-earner. We want to see how the composite commodity, wage-earners' work, has been exchanging for other things in the national market-place, so ideally we should take the average realized payment per unit of wage-earner's input, in a chain index whose weights expressed from year to year the distribution of such input between different jobs. In practice, we have two sorts of material: (a) quoted wage-rates, hourly, or for the normal working week; (b) wage censuses, or pay-rolls, which yield the earnings of the average worker. Each has its drawbacks. The rates that the first records are often minima from which actual payments diverge by different amounts at different times, notably where overtime comes in, and, more generally, where payment by results raises earnings above the basic time-rate. The quoted rate is therefore likely to vary less with the trade cycle than do actual payments for the unit of input, and in a period when methods of payment by results are extending it may diverge from

the trend of these actual payments; but apart from this latter possibility, which probably is not of much account before 1914, the quoted rate is likely to move with the rate of actual payment through the long run. An index of the earnings of the average worker, on the other hand, though of great social interest, has the drawback for our present purpose of not being an index of the price of work. The distribution of wage-earners between different employments is always liable to change, and the movements of the earnings of the average wage-earner are the outcome not only of changes in the rate of pay for a given job but also of the shift of wage-earners between one job and another. It is as though we wanted to study the market for farm produce by tracing the movements of the price of a composite product made up of wheat, sheep, and milk, but were given instead the earnings of the average farmer, when the distribution of farmers between wheat, sheep, and dairy farming had been changing. We therefore decided that the quoted wage-rate, though imperfect, especially in year-to-year changes, came nearest to our purpose. We should have liked to combine these wage-rates in a chain index whose weights changed with changes in the distribution of wage-earners between occupations and industries, but the evidence is not usually extensive enough for this, and we have had to work with fixed weights. Unfortunately, since the rates paid for different jobs vary a good deal relatively to one another, decade by decade, this is not one of the fields in which differences in the weights used prove to make little difference to the index.

It will be seen that the index of real wage-rates is only a partial indication of changes in the standard of living of the wage-earner: where we are able to compare the movements of a fixed-weight index of wage-rates with those of the earnings of the average wage-earner, we generally find that the latter rises more, because of the continual upgrading of labour, the shifting of the centre of gravity of the wage-earners to higher levels of competence and pay. But the index of money wage-rates, and that of product wage-rates, do provide a measure of changes in the cost of the unit of work to the employer: except that they take no account of changes in the amount of work effectively done in a unit of time, and possibly this amount varies through the trade cycle, and is subject also to a trend through the long run, because of changes in physique, education, and morale.

6. The second warning concerns the index of the price-level of final output. This might be thought to be an index constructed from the original records of price, but it is in fact only a blend of available indexes of the cost of living, the prices of manufactures or industrial materials, and wage-rates themselves, in proportions chosen as agreeing roughly with the division of final output between consumption (including services) and

investment. It therefore makes no contribution to price history, but we have compiled it as a check on conclusions drawn from the application of the index of the cost of living, which in itself depends so much on the particular course of food prices.

7. Since the bases of all indexes in each period are the same—all the earlier ones, for example, are to the base 1890 $9 = 100$ —indexes for several countries, when shown in the same diagram with a common scale, all come together in the base years. After some experiment we found that they were more easily compared in this way than if separated in the vertical scale; but it is exposed to the misunderstanding that in some sense the countries were more like one another in those years than at other times, or that they get more like one another as they approach those years, and diverge again afterwards. In fact, of course, we make no comparison of the level of any variate between one country and another, but only compare the changes in it: in any one year, it is of no significance whether two curves are close together or not, or one lies higher than the other, and the eye can find significant contrasts and likenesses between them only in their slopes from one year to another.

II. Changes in Money Wage-Rates

(see Graphs 1, 10)

8. *Even excluding the effects of war, money wage-rates rose from nearly 2 to 5 times through 1860–1939.* The most obvious but also most significant feature of the movements of money wage-rates is that down to 1914 they persistently rose, though not so much so in the United Kingdom as in other countries; that the First World War at least doubled them in all our countries except Germany; and that in the inter-war years on balance they rose again. The argument that when public policy maintains full employment there will be a persistent tendency for money wage-rates to

TABLE I

Approximate Ratio of Average Money Wage-rate at End of Period to its Initial Value

	1860–1913	1913–24	1924–39	Cumulative to 1939	
				Throughout	Omitting war rise
	1	2	3	4	5
France . . .	1.9	5.0	2.5	23.8	4.8
Germany . . .	2.5	1.3	1.0	3.3	2.5
Sweden . . .	3.5	2.5	1.2	10.5	4.2
U.K.	1.7	2.0	1.1	3.7	1.9
U.S.A. . . .	2.6	2.2	1.1	6.2	2.9

rise is sometimes stated so as to imply that this is something new; but we now see that, whether or not this tendency is heightened by full employment, it has been generally operative for many years past, and (at least outside the United Kingdom) it has been operative strongly. The extent of change is summarized in Table I.

9. *From 1880 to the First World War, in all our countries except the U.K., the average money wage-rate usually rose year by year.* Graphs 1 and 10 show that the rises recorded in Table I were built up in different ways. The years from 1860 to the great depression of 1879 were troubled in various ways, and all our countries save France (for which our wage data are the least extensive) show a substantial fall to 1879. The years between the two Great Wars were likewise troubled, and wage-rates moved sharply down as well as up. But in the third of a century between 1880 and 1914 it was unusual for the average money wage-rate not to rise. This is brought out in Table II.

TABLE II
1880-1913 (34 years). *Number of Years in which, relatively to the Preceding Year, the Average Money Wage-rate shows*

	<i>A rise</i>	<i>No change</i>	<i>A fall</i>
	<i>1</i>	<i>2</i>	<i>3</i>
France . . .	24	9	1
Germany . . .	26	5	3
Sweden . . .	29	3	2
U.K. . . .	12	16	6
U.S.A. . . .	25	5	4

In no case did a fall mean giving up more than had been added by rises within the preceding 6 years. All the falls, save those in the U.K. between 1900 and 1905, lie clearly in years of cyclical depression.

Though the years before 1880 show no such persistence of year-to-year rises, we must notice now that their fluctuations lay about much the same rising trend as the years after them followed.

10. *From 1860 to 1913 average money wage-rates follow linear trends, which in Germany, Sweden, the U.K., and the U.S.A. show a hinge about 1895 with a steeper slope thereafter.* A feature of Graph 1 is the closeness with which all series follow linear trends. Great though the upheaval is in the 1870's, the series return after it to the same line as fits their rise before. But the trends of Germany, Sweden, the U.K., and the U.S.A. are hinged about 1895, and the later rise is steeper than the earlier.

It is natural to connect these hinges with the rise of the commodity price-level, which also sets in towards the close of the century. It is

certainly true that the movements of money wage-rates show some correlation with those of commodity prices, or we should not find the steadiness that (as we shall see) does come out in the rise of real wage-rates. But the connexion is not simple, for only in the U.K. does the hinge seem to coincide with the upturn in prices: in Germany, Sweden, and the U.S.A. it comes about 9 years after the upturn in prices; while France shows an upturn in prices but no hinge in wage-rates. This is considered further in para. 20.

A linear trend implies adding about the same absolute amount to the average wage-rate decade by decade: a wage-rate, say, of a shilling an hour becomes 1s. 2d. in 10 years' time, and 1s. 4d. in 10 years again after that. There is no apparent reason why development should follow this course.

A study of the trend of the average money wage-rate divides our countries into three. Sweden stands by itself, with much the greatest rise, especially in the later years. In extent of rise Germany and the U.S.A. come next, close together both in this, and in the path they follow from 1890 onwards. Then come France and the U.K., rising less than the others, and since 1880 not diverging far from one another except in 1905-10.

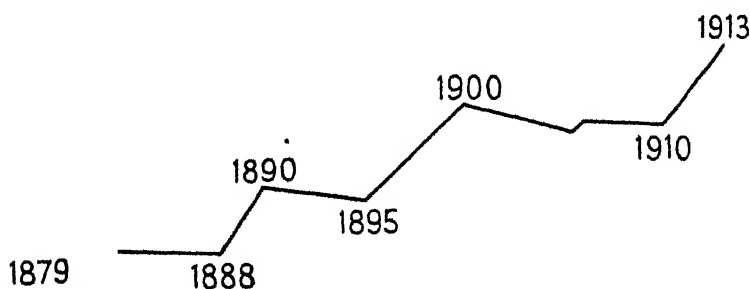


FIG. 1. Schematic representation of changes in average money wage-rate in the United Kingdom, 1879-1913.

11. *The U.K. shows several distinctive features in the course of change in money wage-rates down to 1914.* Of all our countries, the U.K. is the one in which the average money wage-rate rose least: it is also the one in which commodity prices fell most. Its money wage-rate shows more effect of the trade cycle than do those of other countries, or at least our records of them. No country shows so many years in which the average wage-rate did not change. Indeed, it may be unwarranted to see a rising linear trend in the U.K. money wage-rate at all, for what meets the eye after the great cycle of the 1870's is an outline of three terraces, in which the money wage-rate remained the same or even fell a little, connected by three banks in which the level rises sharply in a few years: see Fig. 1.

The U.K. differs from all our other countries, except only Sweden before

1888, in that each trade recession (except 1907-8) brought some fall in the average money wage-rate:

<i>Years of recession</i>	<i>Approximate fall in average money wage-rate</i>
1866-8	4 per cent.
1875-9	7 "
1884-5	1 "
1892-5	2 "
1900-4	3 "

12. *The trade cycle of the 1870's took an exceptionally big effect on money wage-rates, except perhaps in France.* Between 1870-1879 there was a rise and fall in the average money wage-rate in Germany, Sweden, and the U.K., while in the U.S.A. the rate, which already before 1870 had been raised high in the greenback period, fell back sharply with the others to the trough of 1879. It is by no means the case, as we shall soon see, that later trade cycles set no mark on the average money wage-rate, but a glance at the graph shows how much more difference this cycle of the 1870's made than they. Only in France (but here only if our scanty data are representative) was there no mark of it.

	<i>Trade cycle of the 1870's: percentage change in average money wage-rate</i>	
	<i>Rise, 1869-74</i>	<i>Fall, 1875-9</i>
Germany . .	36	14
Sweden . .	28	12
U.K. . .	33	7
		<i>Fall, 1873-9</i>
U.S.A. . .	..	19

We know that this cycle of the 1870's was severe: the British trade-union unemployment rate, for example, was lower in 1872, and higher in 1879, than at any other time before the First World War. But the difference in severity between this and later cycles was not nearly so great as the difference in effect on money wage-rates, and this presents a problem.

13. *After 1879 the trade cycle still imprints a pattern on the movement of the average money wage-rate.* We have studied the effect of the trade cycle on the average money wage-rate, by seeing how the changes in that rate compare in periods of rising, intermediate, and falling general activity. These periods we have delimited, for Sweden according to the movements of new investment per worker in equipment for manufacturing and mining;¹ for the U.K. according to the movements of the trade-union unemployment percentage;² and for the other countries according to the qualitative

¹ Baggo *et al.*: *Wages in Sweden, 1860-1930*, vol. ii, Table 192. The totals of investment are in kronor, uncorrected for price changes.

² Quoted in Beveridge, *Full Employment in a Free Society*, Appx. A, Table 22.

assessment in Thorp and Mitchell's *Business Annals*.¹ The results appear in Table III.

TABLE III

Classification of Years in which the Average Money Wage-rate rose, did not change, or fell, in each of Three Phases of the Trade Cycle, 1860-1913

General activity: No. of years in which average money wage- rate shows:	Rising			Intermediate			Falling		
	Rise	No change	Fall	Rise	No change	Fall	Rise	No change	Fall
	1	2	3	4	5	6	7	8	9
France . . .	22	..	..	4	..	..	24	..	1
Germany . . .	23	..	2	12	..	2	6	1	8
Sweden . . .	19	2	2	11	..	1	9	2	5
U.K.	17	6	..	3	5	3	3	7	9
U.S.A. . . .	16	5	1	7	2	3	9	1	7

The general pattern is a sharp rise of the average money wage-rate in the cyclical upswing, followed by a slower rise, a halt, or a fall, in the succeeding depression. We have already noted (para. 11) that the U.K. is the only country, except Sweden before 1888, in which each recession, except the recession of 1907-8, brought some fall in the average money wage-rate.

14. *The inter-war years show exceptional disturbance but still some tendency for the average money wage-rate to rise more than it falls.* A glance at the graphs is sufficient to convey the contrast between the inter-war years and the years from 1879 to 1914; nor is this impression moderated by more detailed study.

The great rise in money wage-rates through the war and the post-war boom was followed by a sharp fall, but the fall did not go nearly so far as the rise, and the period of relatively stable activity opens in 1924 with money wage-rates far above their pre-war level. The new level was relatively highest in France and lowest in Germany. In between came Sweden, the U.K., and the U.S.A., whose rates were from 2 to 2½ times those at the outbreak of war. There was no precedent within a hundred years for so great a rise of rates within 10 years. We shall see, when we come to the relation between the money wage-rate and national income per occupied person, that this rise in money wage-rates was not merely part of a general rise in prices through inflation of the currency, but brought a shift in internal relations in all these economies.

The cyclical pattern, too, is marked as never in any 20 years before.

¹ W. L. Thorp and W. C. Mitchell, *Business Annals* (National Bureau of Economic Research, 1926).

But the peak of 1920 arose out of the war, and the depression of 1929-33 was not more marked than that of 1873-9. Only in France and Germany, moreover, was the depression of 1929-33 preceded by a peak: in the other countries wage-rates had risen only gently from their post-war trough, and in the U.K. they had turned down already in 1928.

Some series show the direct effect of political forces. The exceptional course of the French series must be attributed down to 1929 to the continuance of inflation after other countries had stabilized, and then after 1935 to *l'Expérience Blum*. Also exceptional is the stabilization of the German rate from 1933: did actual rates diverge from the course of the official index? The first rise in the U.S. series from the trough of 1933 came from the National Industrial Recovery Act.

Only the Swedish series shows, from 1923 to 1939, a pattern of cyclical fluctuation about a rising trend, such as we found 50 years before. Yet it is noteworthy that even in this period it is still rises that predominate on the whole. At the end of it every country has a higher average money wage-rate than it had in 1925. In every country this average rose in more years than it fell (Table IV).

TABLE IV

*Inter-war Years. Number of Years in which the
Average Money Wage-rate shows*

	<i>A rise</i>	<i>No change</i>	<i>A fall</i>
	1	2	3
1925-39 France . .	10	2	3
1926-37 Germany . .	5	4	3
1923-39 Sweden . .	11	3	3
1923-39 U.K. . .	7	1	6
1923-39 U.S.A. . .	11	2	4

15. *Has the wage structure become less flexible?* It has often been asserted, and seems now to be taken for granted, that the wage-structure now is less flexible than it was, in the sense that it offers more resistance to the reduction of money wage-rates when that would be the outcome of the free play of supply and demand. To test this assertion, flexibility should be measured by extent of response to unit pressure. We have no means so far of estimating the pressure, but we do know the aggregate response, for we see that in 1929-33 the average money wage-rate in all our countries fell in a way to which there is no counterpart this side of 1879, except that in Sweden, the U.K., and the U.S.A. it had also fallen sharply 8 years before. On the other side, in the 34 years 1880-1913 in the U.K., there were 16 in which it did not change at all. If, none the less, it was actually

less flexible in those inter-war years, its falls could be explained only by its having been put under greater pressure: so we should have to show that the comparative absence of falls between 1879 and 1914 was due to a comparative absence of depressions, and that the falls of 1874-9, of about the same magnitude as those of 1929-33, came about under less cyclical pressure. What we know of the trade cycle in other ways does not establish this: in the U.K., for example, in the depression of 1874-9 the trade unionists who lost their jobs were about 10 per cent. of all, and in the depression of 1929-33 the insured employed who lost their jobs formed a larger proportion, it is true, but still under 12 per cent. of the whole.

In section IV, however, we shall see that there is a way in which the relation between changes in money wage-rates and in the national income was generally different in the inter-war years from what it was before.

III. Changes in Real and Product Wage-rates

(See Graphs 2-5, 11-14)

16. *Real wage-rates and product wage-rates.* The indexes of real wage-rates measure changes in the rate of exchange between the unit of work and the goods, mainly foodstuffs, on which wages were spent. Indexes of product wage-rates should provide a similar measure of the rate of exchange between the unit of work and final products of all kinds; but we have explained that our indexes of the prices of final products are only blends of other indexes, not workings from the original prices, and serve mainly as a check on the domination of cost-of-living indexes by the price of food. It turns out that in France this check is needful, and our findings there depend a good deal upon whether we turn the wage-rate into units of the goods wage-earners consume or of the goods and services of all kinds that they help to produce. But elsewhere there turns out to be not very much in it: prices of all kinds moved enough in sympathy for the change of price-index to make no great difference to the upshot. In this section we shall for brevity cite results only for real wage-rates, and product wage-rates will not be mentioned save where they seem to have moved really differently.

17. *Except in Germany, the average real wage-rate in 1939 was $2\frac{1}{2}$ times or more what it had been in 1860.* The great and general rise in money wage-rates was not a rise in coin alone, but brought with it a rise in the amount of goods the unit of work would command when wages were spent. This rise in real wage-rates, though smaller than that in money wage-rates, also deserves to be called great and general.

The Swedish rise is outstanding. Next to it, down to the First World War, came the U.K.: money wage-rates rose less then in the U.K. than in the other countries, but the cost of living fell much more. Both Sweden and

the U.K. may have gained more than the others through the fall in the prices of imported foodstuffs in this period; for in them, but not in the others, the product wage-rate rose considerably less than the real wage-rate—2.6 instead of 3.0 in Sweden, 1.7 against 1.9 in the U.K. It is surprising, but apparently clear, that real wage-rates rose relatively rather less in the United States than elsewhere down to 1914.

TABLE V

Approximate Ratio of Average Real Wage-rate at End of Period to its Initial Value

		1860-1913	1913-39	Cumulative 1860-1939
France . . .		1.6	1.9	3.0
Germany . . .		1.6	1.1	1.8
Sweden . . .		3.0	1.8	5.4
U.K.		1.9	1.3	2.5
U.S.A.		1.5	1.7	2.6

The inter-war years were troubled, and the course of wage-rates was more influenced by politics than before: in particular, the apparent stabilization of German money wage-rates from 1933, and attendant fall in real wage-rates, is either a misleading appearance, or an exceptional development; while the swift rise in French real wage-rates to which *l'Expérience Blum* had brought our series at its close leaves reactions incomplete and unknown. But these and other disturbances apart, the inter-war years present a picture of general, and rapid, advance in real wage-rates. Though the period is only half as long as 1860-1913, Sweden and the U.S.A. now achieved greater relative advances than were achieved in 1860-1913 by France, Germany, or the U.S.A. The U.K., with all its difficulties, had raised its real wage-rates by the onset of the Second World War to some three-tenths above their level at the outbreak of the First. Between 1870 and 1895, real wage-rates in Sweden and the U.K. were on the average rising each year by about $1\frac{1}{2}$ per cent. of their mean level in the 1890's; between 1923 and 1939, in Sweden, the U.K., and the U.S.A., they were rising each year on the average by something like 1.7 per cent. of their mean value in the latter 1920's.

18. *A striking feature of 1860-1914 is the persistence of linear trends, and the similarity of these trends between different countries.* The graphs, and especially those of the 9-year moving averages, show how persistently real wage-rates in all our countries follow linear trends. For many years together, that is to say, they rise on the average each year by about the same absolute amount. In the main, it may be thought, the rise of real wage-rates in the long run depends on the balance of the rate of

expansion of total output and the rate of growth of the active population. Is there any reason *a priori* to expect that this balance, in the circumstances of the nineteenth century, should yield a linear trend?

The rise of the Swedish series is exceptional. It cuts across the others, and if anything its later course is steeper than the earlier. The other series all show a hinge at some point not earlier than 1886, and the trend after the hinge rises less steeply than that before; in France and the U.K. it actually falls. Such is the climacteric of the late nineteenth century.

When we look into more detail, we find a mixture of similarities and differences. All the countries except Sweden pass through three phases. First, down to 1879, the course of real wage-rates is choppy, and divergent; their rise is rapid in the U.K., but in France and Germany it is smaller now than later. Next, between 1879 and the hinge, a phase of different length in different countries shows much the same gradient in them all, even Sweden. Then comes the climacteric. If we look only at real wage-rates, the turning-point in several series seems clearly enough marked, but if we turn to product wage-rates we may want to fix it at some years' remove, and no doubt the change of course really took some years to work through the cyclical movement. But a change of course there certainly is, and it brings in the third phase, the Edwardian doldrums, which is characterized by a lower rise from year to year, and greater divergence again between our countries.

Especially when we look at the moving averages of product wage-rates, the resemblances between France, Germany, and the U.S.A. appear more striking than their differences: even though, in the annual series, the U.S.A. is more indented, more eventful, than the others, especially in the middle phase. The U.K., though like the others by contrast with Sweden, follows in some measure a course of its own, rising rather more steeply to the hinge and falling off more thereafter.

There seems to be no correlation between the rates of change of money wage-rates and of real wage-rates. Germany, the U.K., and the U.S.A., for instance, show more steeply rising money wage-rates in the later years, but their real wage-rates rise more slowly then. There is close agreement between the changes of real wage-rates in France and in the U.K. from 1871 to 1899, although the movements of their cost of living were very different. Generally, the divergences between the costs of living in different countries are greater than those between their real wage-rates: divergent movements of prices are offset by divergent movements of money wage-rates so as to yield similar movements of real wage-rates. This is an indication that the economy, so to speak, sees through the veil of money, and follows a course of development in real terms that over the long run is not deflected by the various course of prices and money incomes.

19. *The problem of the late nineteenth-century climacteric.* We need to find some explanation of the turn towards a lower rate of rise in real wage-rates that occurred, in each of our countries except Sweden, at some time not earlier than 1886.

One hypothesis can be put aside at the outset: this change does not seem to have arisen from a change adverse to labour in the distribution of the national income. In section IV we shall show, though our evidence here is not complete or fully reliable, that the relation between money wage-rates and average money income per head of the occupied population, though it was following its own course of gradual change, seems to show no deflexion at the time of the turn in real wage-rates. But if money wage-rates continued to follow much the same course as average money income, real wage-rates must have been keeping much the same relation to average real income. In other words, real wage-rates began to rise more slowly because real income a head throughout the economy was beginning to rise more slowly: and this of course we can check, so far as our data go, by looking directly at the series of real income a head. (Graphs 8, 17.)

The problem, then, is why there occurred at this time a markedly adverse change in the balance between the growth of output and the growth of population. Dr. Willford I. King¹ noticed this change in the U.S.A. and attributed it to the closing of the frontier, and the rising tide of immigration of the unskilled from Europe; but we see now that it is just as marked in Germany and the U.K. An explanation may be offered by a distinction between *process* inventions and *product* inventions. The great changes of the Industrial Revolution may be called process inventions, because they were mostly improvements in the way of making an existing product: in textiles, metallurgy, agriculture, and transport the difference between 1850 and 1750 was not so much that new products had been devised as that the old ones—the yard of cloth, the bar of iron, the sack of wheat, and the ton-mile moved—were now achieved with a much smaller input of human effort. The great increase in output a head of the basic materials of life that those changes made possible was realized at different times in different countries. It was supplemented, especially perhaps in the third quarter of the nineteenth century, by the effective opening to the world market of great new sources of supply of primary produce. But there seems to have come a time when these two sources of higher productivity had become fairly fully exploited, at least in those parts of the world so far affected by them. Meanwhile, technology still developed, but the inventions that characterize the last third of the nineteenth century may be termed product and not process inventions, in that they did not so much provide more efficient ways of making things as suggest new things to make: telephone,

¹ *Wealth and Income of the People of the United States* (1917), c. vii.

gramophone, and electric light; the bicycle; the internal-combustion engine, the motor-car, and soon the aeroplane. Of course many of these things helped also to raise output per unit of input; and in any case they raised the benefit to be derived from a given output, even when they did not raise the physical quantity of it, so that it is not so much that they failed to raise real income as that our ways of measuring real income are inadequate. Yet, with population still rising along something like a constant growth curve, it mattered more to have an extra ton of coal than to be able to turn coal into electric light instead of gaslight. The output of basic materials per unit of human input was no longer being raised as fast as it had been, either by technical changes or by the opening up of new sources of supply; and though improvements of other kinds went on, they did not take enough effect to keep pace with the remorseless growth of population.

This explanation is compatible with the absence of any check to the rise of real income in Sweden, if, as is usually believed, industrialization (in the sense of the application of *process* inventions) took place there later than in our other countries. One check has been observed there at this time, a check to the rise of earnings in the saw-mills, and the authors of our great source on Swedish wages explain this in terms that agree with this answer.

'The average annual earnings at the sawmills', they say,¹ 'rose 32% between the years 1884 and 1900, while the mean percentage for all branches of industry was about 31 for the same period. From 1900 to the base period 1910-13 the sawmills' average went up by 12% while the average for industry as a whole rose 34%. This difference coincides with a corresponding difference in industrial development. By 1900 the sawmill industry was on the whole already fully developed, and since that period it has not undergone much further expansion, whereas elsewhere the industrial expansion has been very considerable.'

But two considerations count against the present explanation. First, it would lead us to expect an adverse movement in the terms of trade of the U.K., which for the most part was exchanging manufactures for primary produce; but that this did happen is doubtful.² Second, it would lead us to expect a gradual change of course, a slowing of the rate of advance becoming apparent only by degrees, whereas in Germany, the U.K., and the U.S.A. the change of direction is made in a short turning arc. There must be something more to be said.

20. *The problem of how the change in productivity worked itself out.* Beside the problem of the causes of the check to productivity is the problem of its consequences. Here we should notice that (in each of the

¹ Bagge, Lundberg, and Svonnilson: *Wages in Sweden, 1860-1930*, vol. ii, p. 56.

² Beveridge, 'Mr. Keynes' evidence for overpopulation' (*Economica*, Feb. 1924); K. Martin and F. G. Thackeray, 'The Terms of Trade of Selected Countries, 1870-1938' (*Bulletin of Oxford Univ. Institute of Statistics*, Nov. 1948).

four countries that show the climacteric) the price-level, money wage-rates, the long-term rate of interest (Graph 9), and real wage-rates with few exceptions all show some change of course in the same period. Broadly, up to the climacteric,

the price-level is falling;
 money wage-rates are rising;
 the long-term rate of interest is falling;
 real wage-rates are rising rather steeply.

And after the climacteric,

the price-level is rising;
 money wage-rates are rising more steeply than they were;
 the long-term interest rate is rising;
 real wage-rates are rising more slowly, or not at all.

It is interesting to ask whether these changes came about in any intelligible sequence. Now to identify any one year as a point of inflexion in any of these series is not easy: more especially, when the series is cyclical, we get different years according as we take the high or low point of the actual series or of a smooth curve such as a sliding average fitted to it. But after separate readings of the graphs for the two kinds of price-level and of wage-rate it seemed possible to give the summary statement of turning-points which is offered in Table VI: though the single years cited here must be taken as lying at about the middle of the turning arc rather than as the exact date of a hinge between linear trends. Only in France, where the movement of the cost of living at this time was exceptional, has it seemed necessary to treat the two kinds of price-level and wage-rate separately.

TABLE VI

	<i>Years marking approximate midpoints of:</i>			
	<i>Upturn in prices</i>	<i>Check to real wage-rates</i>	<i>Upturn in money wage-rates</i>	<i>Upturn in long term rate of interest</i>
	1	2	3	4
France (a) . . .	1906	1906	Nil.	1897
" (b) . . .	1897	1897	Nil.	1897
Germany . . .	1886	1888	1895	1896
Sweden . . .	1887	Nil.	1895	1897
U.K.	1895	1897	1895	1896-7
U.S.A.	1886	1886	1896	1900

(a) Taking cost of living and real wage-rates.

(b) Taking price-level of final output, and product wage-rates.

It will be seen that generally the first two columns go together, and so do the second two. In Germany and the U.S.A. the change in the first two

preceded by about one trade cycle that in the second; and, though for prices alone of the first two, the same holds for Sweden. In the U.K. both pairs of turning-points came at about the same time. In France money wage-rates took on no steeper slope, but otherwise we get two possible relations: with the price-level of final output, and product wage-rates, much as in the U.K.; but with the cost of living and real wage-rates, the first two columns following about one trade cycle behind the fourth. This last is the only instance of the upturn in the rate of interest preceding that in prices.

The following hypothesis is suggested as an explanation of the sequence which the above observations indicate.

There are three phases. In the first,

- (a) occupied population is rising;
- (b) the flow of money payments is rising so much that money income per head of the occupied population is also rising;
- (c) aggregate physical output is rising faster still, so that unit prices are falling;
- (d) the rise in money incomes against falling prices fosters the unspent margin and raises the supply of loanable funds so that the long-term rate of interest falls.

In (b) it might be either that money income a head is rising passively, as the consequence of changes arising in the supply of money; or that the rise in money income a head is proceeding *proprio motu*, through the tendency of people to ask for and get higher money incomes, and the changes on the monetary side do but happen coincidentally, or are induced consequentially, to make this rise in money incomes possible. We do not have to decide between these possibilities here, but it will be seen that in the third phase we have to assume the latter of them.

The second phase contains the first two columns of Table VI.

- (a) the occupied population continues to rise at much the same rate as before;
- (b) the flow of money payments also continues to rise, so that money income a head rises much as before; but
- (c) aggregate output now no longer rises faster than the flow of money payments, so that the fall in prices is checked, and they begin to rise again; when they do this, the slowing down of the rise in aggregate output has gone far enough to check the rise in real income a head and in real wage-rates;
- (d) for the present the combination of still rising money incomes a head with stationary prices, or prices beginning to rise from a low level, suffices to maintain the supply of loanable funds, and interest rates do not rise.

So far we have accounted for an upturn in prices setting in at about the same time as a check to the rise in real incomes.

This process continuing, we enter the third phase:

- (a) continues as before;
- (b) the rise in prices now becoming marked, money incomes are raised faster in an attempt to catch prices up—we assume here the possibility of an autonomous movement of rates of money income, whether or not the supply of money proves adequate to them in the event;
- (c) the check to the rate of rise of real incomes continues;
- (d) in the spiral of prices and incomes, a smaller unspent margin accrues and the supply of loanable funds is reduced; also, it may be, the 'autonomous' rise in rates of money income raises the demand for working balances faster than the expansion of the supply of money is providing them, so that securities are sold, or the supply of loanable funds is otherwise drawn upon, to provide working balances: so the rate of interest begins to rise.

This hypothesis fits the observations above, to the extent that it accounts for the upturn in prices and the check to the rise in real wage-rates coming together, and then a steeper rise in money wage-rates coming with an upturn in the rate of interest at some later date, at any rate not before the first two changes. This is the pattern of our observations generally, except that in France there is no upturn in money wage-rates, and the movement of the cost of living there is exceptional. But the hypothesis does not show why in the U.K. the second pair of changes came about at the same time as the first, whereas in Germany and the U.S.A. they followed after one trade cycle.

Nor does the hypothesis account for what happened in Sweden, where the other three changes occurred without any check to the rise in real wage-rates: that is, the adverse change in the balance of output and population, on which the hypothesis depends for the initial upturn in prices, does not seem to have happened here at all. We should then have to suppose that the upturn in prices in Sweden came through Swedish internal prices following the international market—that prices rose, and money incomes went up in chase of them, as part of an inflationary spiral imposed from without, notwithstanding that within Sweden itself there was no check to the output of goods relatively to the flow of money. Since the rise in real incomes was not checked, we should have to explain the upturn in interest rates not by any check to savings but by increased demand for working balances.

It will be seen that the hypothesis depends on the possibility of an autonomous rise in money incomes: a rise, that is, which does not emerge as the outcome of a change in the balance of output and money flow, but

takes place on its own, and only then sets about finding the money with which to implement itself. If the hypothesis is to fit Sweden, it depends also on the possibility of a rise in the price-level which, though induced by the world market, also occurs independently of change in the internal monetary equation. In days of inflationary pressure we accept both these possibilities; but probably some economists would say that that is only because there is now the money there already to implement a bigger flow, whereas before 1914 this was not usually so, and raising money incomes or prices then would not usually find extra money waiting to be used, nor would it do anything to induce a rise in a money flow which was determined quite independently. Are we sure that this was always so? To be sure, the accounting identity $MV = PT$ always holds; but the question is whether, at a time of the expansion of the banking system, a rise in P could not induce a rise in M . It is not to be denied, again, that a rise in M is sometimes the original source of a rise in P , or that fixity of M may hold P down; but the question is whether (i) P (more especially, the rate of money incomes) may not always have been straining at the leash, and of its own accord making rises which it could hold whenever an adventitious rise in M came along to equip it with money stocks, or (ii) the rise itself through the banking system induced a rise in the effective MV . Two points are significant here. We have to account for a rise in money income a head which, except in 1873-86, was persistent, for half a century, in five countries, in varied states of monetary supply. We know that in the U.K. at least employment ruled higher, in more than half the years of this period, than the 97 per cent. that has been taken as the criterion of full employment: if we take the better half of each of the five major cycles that occupied the years 1866-1912, we have 25 years out of the 47, and in these 25 the trade union unemployment rate averaged 2.9 per cent.

21. Rises in money wage-rates usually went with rises in real wage-rates.

'It would be interesting', said Keynes in *The General Theory* (Bk. I, c. 2), 'to see the results of a statistical enquiry into the actual relationship between changes in money-wages and changes in real wages. In the case of a change peculiar to a particular industry one would expect the change in real wages to be in the same direction as the change in money-wages. But in the case of changes in the general level of wages, it will be found, I think, that the change in real wages associated with a change in money-wages, so far from being in the same direction, is almost always in the opposite direction. When money-wages are rising, that is to say, it will be found that real wages are falling; and when money-wages are falling, real wages are rising. This is because, in the short period, falling money-wages and rising real wages are each, for independent reasons, likely to accompany decreasing employment; labour being readier to accept wage-cuts when employment is falling off, yet real wages inevitably rising in the same circumstances on account of the increasing marginal return to a given capital equipment when output is diminished.'

The present data show only the change between the average of one year

and that of the next, which may not represent the kind of short-period movement Keynes had in mind. Before 1914, moreover, they cover a period in which money wage-rates and real wage-rates were both persistently rising, so that we naturally find that in most of the years when the money wage-rate was up the real wage-rate was up too; whether the bigger rises in money wage-rates would prove to have gone with the bigger rises in real wage-rates is another question. Our data therefore provide no test of the assumption that in certain short periods, at times when the cyclical movement is large relatively to trend movement, the changes in money and real wage-rates will be inverse. But they warn us against assuming that in general a change in the money wage-rate is likely to go with an opposite change in the real wage-rate. They are summarized in Table VII. In the inter-war years, such falls in the money wage-rate as there were did more often than not go with rises in the real wage-rate, but before 1914, more often than not the two rates fell together; and, except for France before 1914, and the U.K. between the wars, in the great majority of cases they rose together.

TABLE VII

Number of Years in which, when the Money Wage-rate stood higher than in the Year before, the Real Wage-rate also stood higher, or showed no Change, or stood lower; and similarly for Years in which the Money Wage-rate stood lower

	Years in which money wage-rate stood HIGHER than in the year before:							
	1861-1913/14				Inter-war years			
	Total	Real wage-rate			Total	Real wage-rate		
		Higher	Same	Lower		Higher	Same	Lower
France . . .	39	19	3	17	10	6	..	4
Germany . . .	38	24	4	10	5	5	..	..
Sweden . . .	40	30	4	6	11	8	3	..
U.K.	23	18	1	4	7	2	2	3
U.S.A.* . . .	26	17	4	5	11	8	2	1

	Years in which money wage-rate stood LOWER than in the year before:							
	1861-1913/14				Inter-war years			
	Total	Real wage-rate			Total	Real wage-rate		
		Higher	Same	Lower		Higher	Same	Lower
France . . .	1	1	..	..	3	3	..	..
Germany . . .	6	1	1	4	3	1	..	2
Sweden . . .	8	3	1	4	3	2	..	1
U.K.	12	4	3	5	6	3	1	2
U.S.A.	11	5	1	5	4	2	1	1

* From 1872 only.

If we take out all the years in which a rise in the money wage-rate failed to bring a rise in the real wage-rate, we find they fall mainly into two categories: either they are years in which the cost of living first rises again after a period of fall, or they come in the course of a big and sustained rise in the cost of living. In both types it is the cost of living that seems to be taking the initiative, and the money wage-rate for the while is failing to keep up with it.

22. *Changes in real wage-rates have come about in all manner of ways, but most often rises have come by rises in money wage-rates without a fall in prices, and falls have come by rises in prices without a fall in money wage-rates.* The results are summarized in Table VIII. It will be noticed that France shows an exceptional inverse relation between changes in money wage-rates and the cost of living. Of Britain in the Industrial Revolution Professor T. S. Ashton says:¹ 'It was because the purchasing power that came to the cultivator trickled so slowly through his closed fingers that periods of poor harvests . . . were usually followed by stagnation of trade, falling wages, and unemployment'; perhaps it was the same in France in the later nineteenth century. The U.K. stands rather apart from the other countries, because the cost of living there fell more and money wage-rates rose less. The inter-war years show a higher proportion of rises in real wage-rates coming through falls in the cost of living.

TABLE VIII

Number of Years in which a Change in the Real Wage-rate came about in a Given Way

Ways in which it is possible for the real wage-rate

(a) Money rate rises, prices also rise, but less.
 (b) Money rate rises, prices do not change.
 (c) Money rate rises, prices fall.
 (d) Money rate does not change, prices fall.
 (e) Money rate falls, prices also fall, but more.

To fall

(f) Money rate rises, prices also more.
 (g) Money rate does not change, prices rise.
 (h) Money rate falls, prices rise.
 (j) Money rate falls, prices do not change.
 (k) Money rate falls, prices also fall, but less.

		<i>Number of years in which</i>											
		<i>Real wage-rate rose</i>						<i>Real wage-rate fell</i>					
		<i>Total</i>	<i>(a)</i>	<i>(b)</i>	<i>(c)</i>	<i>(d)</i>	<i>(e)</i>	<i>Total</i>	<i>(f)</i>	<i>(g)</i>	<i>(h)</i>	<i>(j)</i>	<i>(k)</i>
France	1861-1913	27	1	..	18	7	1	20	17	3	..	..	..
Germany	1861-1913	30	10	5	9	5	1	18	10	4	4	..	..
Sweden	1862-1913	37	14	4	12	4	3	10	6	..	1	1	2
U.K.	1861-1914	31	8	4	6	9	4	15	4	6	2	2	1
U.S.A.	1872-1914	24	10	2	5	3	4	11	5	1	2	..	3
France	1925-39	11	6	..	..	2	3	4	4	..	..	..	..
Germany	1926-37	6	3	1	1	..	1	5	..	3	..	..	2
Sweden	1923-39	11	3	1	4	1	2	1	..	..	..	..	1
U.K.	1923-39	5	2	..	..	..	3	5	3	..	..	..	2
U.S.A.	1923-39	11	4	1	3	1	2	2	1	..	..	..	1

¹ T. S. Ashton, *The Industrial Revolution, 1760-1830* (Home University Library), c. vi.

23. *In the trade cycle, rises in real wage-rates come about in the rising phase more often than in the falling, but there are also many rises in the falling phase, and the cyclical pattern is not marked.* We can count the various ways in which real wage-rates changed in each of the three phases of cyclical activity already described in para. 13. The results for 1860-1914 are in Table IX. In every country except Sweden there is a higher proportion of rises in the real wage-rate in the phase of rising activity; but the contrast between the rising and falling phases is not sharp, for real wage-rates also rose in more than half the years of falling activity.

TABLE IX

1860-1914. *Number of Years in which Real Wage-rates rose, did not change, or fell, in Each of Three Kinds of Cyclical Phase*

<i>General activity:</i> <i>Number of years in which average real wage-rate shows:</i>	<i>Rising</i>			<i>Intermediate</i>			<i>Falling</i>		
	<i>Rise</i>	<i>No change</i>	<i>Fall</i>	<i>Rise</i>	<i>No change</i>	<i>Fall</i>	<i>Rise</i>	<i>No change</i>	<i>Fall</i>
France . . .	12	1	8	3	..	1	12	2	10
Germany . . .	15	2	8	6	3	4	5	2	8
Sweden . . .	19	2	2	11	..	1	9	2	5
U.K.	16	3	4	5	2	4	9	3	7
U.S.A.	14	4	4	5	3	4	9	2	7

In the inter-war years, only in Germany is the depression of 1929-33 accompanied by more than a halt to the rise in real wage-rates; though in the U.K. they hardly rose in the general recovery.

IV. The Wage-income Ratio

(See Graphs 6, 7, 15, 16)

24. *The significance of the wage-income ratio.* For several reasons which will appear, it is instructive to compare the movements of money wage-rates not only with those of commodity prices but also with those of money income a head, which is some measure both of the pocket out of which the ultimate buyer of labour is spending and of the earnings of factors other than labour. We have therefore divided our index of money wage-rates by an index of national income per head of the active population, to yield a quotient which we shall refer to as the wage-income ratio. National income is taken at current factor prices. The active population is either the gainfully occupied population, as that is distinguished in census returns, or (more often) the whole population within the normal age-limits of working life. In taking this our aim is to measure changes in the effective working force of the economy, and exclude those in the numbers of children and

old folk. Dividing this active population into the whole national income gives an approximation to the money income of the average member of the working force—an approximation only, because some of the national income accrues to those not in this force. The wage-income ratio falls when money wage-rates rise less, or fall more, than the average of money incomes generally, and rises when this disparity runs the other way. It throws light on the movements of wage-rates in several ways, which are suggested by the graphs.

25. Some salient features of the movements of the wage-income ratio. Evidently these are:

(a) The five countries show a striking similarity in their movements, and particularly, in the earlier period, in a rise through the 20 years after 1870, and then a sustained downward trend; though in the U.K. this trend seems to have set in already in the 1870's. We shall show that it probably arises out of the development of the social structure within each country.

(b) Where annual data are available, the ratio shows a marked cyclical movement.

(c) Besides the above movements the ratio shows some 'lifts'—big rises which, even if they coincide with a cyclical phase, are not taken back in the next phase, but seem to set the ratio on a new plateau. Such is the rise in the U.K. from 1871 to 1879; the rise in all countries from 1914 to the level of the later 1920's—a rise remarkably similar in extent in all countries save Sweden, which rose more than the rest; and—possibly—the rise in France and the U.S.A. from 1931 to 1938. We shall examine these lifts as the problem of a sudden change in the rate of exchange between labour and other factors of production.

(d) The exceptional amplitude of the cyclical movement in the inter-war years—in Sweden and the U.S.A. around 1921, and in all countries after 1929—raises the problem of the flexibility of the wage structure in the modern economy.

We shall examine these features in turn.

26. The trend of the wage-income ratio as the outcome of the development of the social structure. The trend of the wage-income ratio depends on the social structure and the relative pricing of different productive factors, in a way which may be indicated as follows. Let us call

w the average money wage-rate;

e a conversion factor which converts the average money wage-rate into the rate of earnings of the average wage-earner, which are *ew*;

N the total number of occupied persons;

t the proportion of all occupied persons who are not wage-earners, so that

$(1-t)N$ is the number of wage-earners, and

$ew(1-t)N$ is the total wages bill.

Further, let

s be the ratio of the average income of the non-wage-earner to the average income of the wage-earner, so that

sew is the income of the average non-wage-earner, and

$sewtN$ is the total income of non-wage-earners.

If we neglect any income accruing to wage-earners other than wages, and include all income other than wages in the average income of the rest of the active population, that is, of those we have called the non-wage-earners, then

$$ew(1-t)N + sewtN$$

is the whole national income, that is,

$$ewN(1 + (s-1)t). \quad (1)$$

Then the share of wages in the national income is given by

$$ew(1-t)N \text{ divided by } (1),$$

or

$$\frac{1-t}{1 + (s-1)t}. \quad (2)$$

Our index of the wage-income ratio consists of the wage-rate w divided by $1/N$ times (1), or

$$\frac{1}{e(1 + (s-1)t)}. \quad (3)$$

Evidently (3) is an exact index of the share of wages in national income, (2), only if $e(1-t)$ is constant. The movements of our index, (3), are associated with movements of e , t , and s . Can we say how these three terms vary?

We know that e varies both in the long run and in the short. In the long run, a fixed-weight index of wage-rates such as we use here rises less than the earnings of the average wage earner, because of the upgrading that is going on within the body of wage-earners, so that the average man there comes to fill a better-paid job;¹ and also, as payment by results extends, because the quoted time-rate comes to be an inadequate index of actual earnings. As time goes on, then, e will usually rise. In the short run, e may be expected to rise and fall considerably with general business activity: as activity rises, the unemployment and short time which have been reducing average earnings without much affecting rates begin to give

¹ Comparison of Bowley's index of wages 'allowing for change in numbers in occupations', with G. H. Wood's index of 'money wages for workman of unchanged grade', suggests that about half the rise in the earnings of the average British wage-earner between 1880 and 1910 was due to upgrading within the body of wage-earners, as distinct from rises in the wage-rates for particular jobs. See Bowley, *Wages and Income in the United Kingdom since 1860*, Table I.

place to fuller employment and overtime, whilst the rates actually paid may rise above the quoted basic rates; conversely as activity falls. The long-run change in e may be evaluated for the U.K. as follows;¹ we give the estimated rise in e against a value of unity at the base date:

1881	1891	1901	1911	1911	1931	1948
1.0	1.105	1.181	1.226	1.0	0.820	1.181

We know that in Great Britain the proportion of all occupied who are wage-earners has been falling steadily since 1881, so l has been steadily rising:²

1881	1891	1901	1911	1931
0.181	0.200	0.222	0.253	0.278

It seems unlikely that l changes much in the short run or with the cycle.

The changes in the value of s , the ratio of the average income of the occupied non-wage-earner to that of the wage-earner, can be calculated³ for the U.K., and the result is remarkable:

1881	1891	1901	1911	1931	1948
7.46	6.23	5.55	5.53	4.56	3.35

¹ Our index of average money wage-rates is divided into the movements of average earnings obtained by dividing the total wages bill by the number of wage-earners. For 1881-1911 the wages bill and the number of wage-earners are those given by Bowley, *Wages and Income in the United Kingdom since 1860*, table XII, and p. 91; both are taken exclusive of shop assistants. For 1931 and 1948, the wages bill for the U.K., now exclusive of Eire, is taken from Bowley, *ibid.*, and Cmd. 7649, and is divided by the estimated number of wage-earners in the same area; the result is compared with the average earnings for the whole U.K. inclusive of southern Ireland previously obtained for 1911. The estimated number of wage-earners for 1931 is taken from Bowley, *Studies in National Income*, table II, p. 56; that for 1948 is obtained by extrapolating percentages of all men and women occupied who are wage-earners, given in the same source in Bowley, and applying the extrapolated percentages for 1948 to the Total Working Population of Great Britain now reported in the *Monthly Labour Gazette*, and raising the result by 1.028 to cover Northern Ireland.

² See Bowley, *Wages and Income*, p. 91 (whole U.K., through 1911) and Appendix E, p. 136 for Great Britain only, 1931; all estimates exclude shop assistants from wage-earners.

³ For 1881-1911 the total of wages, the number of wage-earners, and the number of occupied persons other than wage-earners, are from Bowley, *Wages and Income in the United Kingdom since 1860*, pp. 76, 91; the total of income other than wages is obtained by subtracting the total of wages given by Bowley from the whole national income given by Prost, in the *Economic Journal*, March 1948. Shop assistants are excluded from both the wages bill and the number of wage-earners. For 1931 the procedure is the same, except that our numbers of wage-earners and non-wage-earners in the occupied population are now for Great Britain only (Bowley, *op. cit.*, Appx. E, p. 136), and in dividing these numbers into totals of income which include Northern Ireland we assume that the proportionate make-up of the occupied population there is not very different from that of Great Britain. For 1948 the totals of wages and of all other income are taken from the White Paper on National Income, Cmd. 7649 of 1949; the number of occupied persons is taken as the total working population reported in the *Ministry of Labour Gazette*; and the number of wage-earners is estimated as described in the note on the estimate of e for 1948.

The calculation assumes that wage-earners have no source of income but their earnings, and that all income other than wages accrues to the occupied non-wage-earners and no others. Neither of these assumptions is wholly justified, and their effect is to make our estimates for s higher than they ought to be. But there is no reason to think these assumptions exaggerate the change from one year to another, and this is striking. The fall seems to have been checked between 1901 and the First World War—is this another aspect of the Edwardian doldrums?—but it was big before ever public policy was much exerted (save through education) in the cause of greater equality. These ratios, moreover, are of incomes without deduction of tax or addition of social benefits, so that the continued decline, to a ratio in 1948 apparently less than half that of 1881, must be attributed mainly to the processes of social growth. We see the ‘eddies, such as have always fluttered over the surface of progress. And though they are on a larger and more imposing scale in this modern age than before; yet now, as ever, the main body of movement depends on the deep silent strong stream of the tendencies of normal distribution and exchange; which “are not seen”, but which control the course of those episodes which “are seen”’¹

From this evaluation of some parts of the U.K. structure we can draw some conclusions:

We cannot explain the trends of the wage-income ratio as marking trends in the distribution of the national income. The share of wages in national income bears to the wage-income ratio the ratio $e(1-t)$, and in the U.K. this has by no means been constant:

1881	1891	1901	1911	1911	1931
0.819	0.884	0.919	0.916	0.717	0.592

But the trend in the wage-income ratio can be seen to arise out of the changes in e , s , and t . A rise in any of these tends to lower the ratio. In the U.K. before 1914, e and t were rising, and s falling, but not enough to offset the rises of the other two, so that the ratio was falling: a unit of wage-earner's work was coming to exchange for a smaller part of the average purse, partly because the earnings of the wage-earners themselves were going up faster than the price of a constant unit of work, and partly because the same upgrading as brought this about was also shifting the occupied population into the higher-paid jobs above the wage-earners' capacity; though this last tendency did not take as much effect as it would have done had not the average receipts (from all sources) of this growing middle class been falling relatively to the earnings of a wage-earner.

It is tempting to connect the downward trend from 1890 with the

¹ Marshall, *Principles*, vi. viii. 10.

climacteric in real wage-rates that we have already discussed, but on closer scrutiny there proves to be no evidence for this; on the contrary, of the two countries for which alone we have good year-to-year estimates of national income at this time, the U.K. shows a fall in the wage-income ratio setting in long before the downturn in real wage-rates, and Sweden shows closely the same fall in the ratio from 1885 onwards without any check to the rise of real wage-rates at all.

Since e , s , and t are unlikely to vary much in the short run except for the cyclical movement of e , the absence of any non-cyclical change of course in a country's wage-income ratio suggests that any contemporary change in the trend of real wage-rates there did not go with a change in the distribution of the national income, and this is evidence worth having when we can estimate the course of change in the total of national income without knowing much about its distribution.

27. *The cyclical movement of the wage-income ratio.* This cyclical movement is clearly marked, and inverse to the business cycle: partly because, as we have seen, e is likely to rise when employment is good, partly because profits fluctuate more than other parts of income, and cause other income to bear a higher ratio to the wages bill in good times than in bad.

In the U.K. down to 1914 the wage-income ratio is very closely correlated with the trade-union unemployment percentage, the rises and falls of the two being almost exactly synchronized: except that in the 1870's the wage-income ratio began to rise while unemployment was still falling, and reached an exceptional peak in 1875, while unemployment was still less than average. Here again is evidence that the cycle of the 1870's was different from others in more than size alone, and finds no counterpart until the inter-war years. The rise in the ratio from 1871 to 1875 seems to be one of the 'lifts', to which we now turn.

28. *The problem of 'lifts' in the trend of the wage-income ratio: how indeterminate are relative factor prices?* One reason for calculating the wage-income ratio is that commodity price indexes are not a sufficient means of lifting the veil of money from the price of a productive factor. When the price we are concerned with is that of a final product, then probably we are interested chiefly in the power of this product to command other goods in exchange, and deflating by a commodity price index gives us this. But when we are studying the price of a productive factor we want to be able to compare it with the prices of other factors. If we found, for instance, that the unit of labour had come to exchange for half as much again of final produce as before, we could still hardly say that the exchanges had moved favourably to labour, if at the same time the real price of other factors had doubled. And more especially, when can we say that a productive factor is really cheaper, or dearer, than before? In what sense can we

say that the price of the unit of labour has moved in a direction helpful, or adverse, to more employment? Not just if the quantity of goods in general to be given in exchange for the unit of labour has fallen or risen; for if there has been a change in productivity, a given quantity of goods can be found more or less easily than before. The test must be whether the unit of labour is now to be bought with a smaller or greater part of the produce, in present conditions, of a standard composite quantity of productive factors. Some approach to an index of this output per representative unit of input is given by an index of national income per head of the active population. It would be just what we want, only if the quantities of other factors varied proportionately with the numbers of the active population, and this they do not: presumably, the quantity of equipment often rises more, that of 'land' less. But though we have to allow for the unit person in the active population working with more and more equipment, if less 'land', as time goes on, it seems better to assume that equipment and resources of all kinds increase on the whole proportionately to the active population, than to assume that they do not change at all: so that we can take national income per head of the active population as indicating, subject to some reservation, the course of change in output per representative unit of input, and this is the purse out of which productive factors are bought.

It will be seen that when we do this we are untroubled by the problem of commodity price-levels, for the average income, in current money, is compared directly with the price of the productive factor we are considering, and neither of these has to be deflated in the usual sense. Our procedure enables us to compare the change in the money price of one factor with something like the change in the price of factors generally, and the wage-income ratio gives us the rate of exchange of a unit of wage-earners' work not against quantities of produce but against quantities of other factors. The index of national income per head of the active population may therefore be regarded as an approximation not only to an index of output per representative unit of input but also to an index of the price-level of productive factors. But on either way of looking at it, the wage-income ratio is there to answer the question, Has the price of the unit of work really gone up or gone down, in the sense that it now offers more, or less, resistance to the would-be purchaser?

This being so, we should not expect to find the wage-income ratio being lifted in a few years to a new level which it then retains for some time. That it will follow a trend according to the course of social development, and that it will swing cyclically, we have already seen; but that it should be capable of being lifted a long way fairly quickly, without reacting towards its former level, seems unlikely - for such a lift means that within

a few years the resistance offered by the price of the unit of work has been substantially raised. Yet we have seen that such lifts do occur. In particular, when steady activity begins again after the First World War, in all five countries the wage-income ratio was not less than 20 per cent. higher than in 1914: that is, to buy a unit of wage-earners' work now required a share of the buyer's purse greater by one-fifth than before the war; and this new level was sustained until in the depression the ratio rose again. It is remarkable that the change should have been so great. It is remarkable that it should have occurred in all five countries.

What is the explanation? The evidence here seems to give no guidance. Two explanations suggest themselves *a priori*: one, that the change carried with it an internal tension, which accounts for some of the violence of the depression which followed; the other, to very different effect, that shares are squeezable, that relative factor prices are not very determinate, or that if they are, the reactions which do make them so are slow to take effect, so that when some shock such as war-time inflation with deflation following has shifted the wage-income ratio, it just tends to stay where it has been put, at least for longer than we were able to observe in the 1920's.

It is interesting that both in the U.K. and the U.S.A. the wage-income ratio has apparently not risen, but actually fallen, through the Second World War.¹

29. *The flexibility of wage-rates: wage-rates fell as much from 1929 as ever before 1914, but the fall of national income was greater in the later period.* When we were looking at money wage-rates we saw that 'in 1929-33 the average money wage-rate in all our countries fell in a way to which there is no counterpart this side of 1879, except that in Sweden, the U.K., and the U.S.A., it had also fallen sharply eight years before' (para. 15). But we saw that this was an incomplete text of flexibility, because we could not compare the movement with the pressure to move. We can now throw

¹ *For the U.K.*: assuming that the active population has changed in proportion to the numbers aged M. 15-64, F. 15-59, we get a rise in the active population of about 6.2 per cent. from 1938 to 1948. Meanwhile national income had risen from £m.4,640 to £m.9,675 (Cmd. 7649 of 1949). So national income per head of the active population had risen by about 96 per cent. For wage-rates, the London and Cambridge Economic Service index gives 186 for July 1948 and 189 for October 1948, relatively to August 1939; relatively to 1938 the index might be put at 192 for mid-1948. Splicing the new to the old Ministry of Labour index would give a smaller rise, to about 178. By either test the wage-income ratio has fallen.

For the U.S.A.: all estimates from the *Statistical Abstract of the U.S.*, 1948:

	1940	1947
1. (Table 306) National income, \$m.	81,347	202,598
2. (Table 200) Total in labor force, '000s	56,030	61,608
3. (Table 235) Estimated straight-time average hourly earnings of production workers in manufacturing industries, \$	0.654*	1.195*
4. Inferred change in wage-income ratio, 1940 = 100	100	81

* At July; 1940 figure by interpolation.

a little light on this, for we can compare the fall in wage-rates with the fall in income a head that accompanied it. In doing this, we do not imply that income a head moves independently of wage-rates, so that these could be called perfectly flexible if they moved in the same proportion as income; on the contrary, it may well be that if wage-rates had come down more, income would have come down more too; but the comparison serves to show the extent of divergence realized at the time of the fall being checked. We find, then, that the falls of income a head in the depressions of those inter-war years were greater than any in our records since 1860. From our wage-income ratio we find also that in both depressions the disparity between changes in wage-rates and in income rose higher than ever before.

So if money wage-rates showed themselves in any sense less flexible in the inter-war years, it was only that they did not keep pace with changes of income which would have required them to fall much more than they had ever done between 1860 and 1914.

LONDON SCHOOL OF ECONOMICS

APPENDIX: SOURCES AND METHODS

I. FRANCE

A. Wages

1. 1860-1913

(a) *Source*. The choice of index was made after graphical comparison of the following:

1. F. Simiand, *Le Salaire, l'évolution sociale et la monnaie* (1932), iii. 99-100, 'Industrie, indice du salaire', for 1851 and every fifth year after through 1911, except 1856, and with 1872 instead of 1871. This index appears to have been adopted as representing the central tendency appearing on graphical comparison (see vol. iii, Diagrams A, B) of the available series, which are described in vol. i, bk. ii, and of which the most important seem to have been: (all for men's wages, France excluding Paris) 1a. *Enquête sur l'industrie 1861-65* (Statistique générale de la France, 2^e série, t. xix), daily rates, representative central value; and *Salaires et durée du travail dans l'industrie française 1891-93* (Office du Travail), daily rates, sample of about one-third of the wage-earners in 'grande et moyenne industrie', weighted arithmetic mean. 2a. *Statistique annuelle, grande industrie, 1881-87* (Statistique générale de la France, nouvelle série), data collected by the *préfets*, 30 industries, daily rates, unweighted means. 2b. *Enquête parlementaire sur les conditions du travail* (1872), daily rates, incomplete coverage of whole field of industry; mean calculated by Levasseur, *Histoire des classes ouvrières et de l'industrie en France de 1789 à 1870*, 2^e édition (1904). 4a, 4b. *Bulletin of the U.S. Dept., of Labor* (Sept. 1904, and 1899, pp. 418-20); from the former, for 1890-1903, a mean of hourly rates in 8 occupations in France excluding Paris; from the latter, for 1870-96, a mean of daily rates in 15 occupations in Lyons. 5a, 5b. *Renseignements fournis par les Conseils de prud'hommes et par les Maires des chefs-lieux de département* (sources at Simiand, i. 316, n. 1), unweighted arithmetic mean of the usual hourly or daily rates in about 38 occupations, 1896 and every fifth year through 1911. 6a, 6b. *Renseignements fournis par les Maires des chefs-lieux de département* (Statistique générale, nouvelle série), annually 1871-87, unweighted arithmetic mean of daily rates in 53 occupations, of which 9 were also reported on in 1892, in *Salaires et durée du travail* (see 1a above).

2. *Salaires et coût de l'existence à diverses époques, jusqu'en 1910* (Statistique

générale de la France, Ministère du Travail, 1911) gives at p. 20 an index of wage-rates for 1860 and each fifth subsequent year through 1910, which gives the central tendency shown on graphing the following principal data: (i) mean wage-rate of 11 occupations in the Paris building trade; (ii) mean wage-rate of 34 occupations in the capitals of *départements*, reported by Maires and Conseils de Prud'hommes; (iii) mean over a 5-year span, centred on its middle year, of wage-rates of coal-miners; (iv) mean of wage-rates reported in the *Enquêtes industrielles* of 1860-5, 1891-3. In his preface (p. 6) M. Lucien March remarks of the tracing of the central tendency, 'il y a, en effet, entre les diverses professions, une solidarité suffisante pour justifier, dans une certaine mesure, cette généralisation'.

3. *Bulletin of the U.S. Dept. of Labor* (Sept. 1898), 668: average daily wages in gold of 21 occupations in Paris, 1870-98.

4. J. Kuczynski, *Die Entwicklung der Lage der Arbeiterschaft in Europa und Amerika 1870-1933* (Philographischer Verlag, Basel, 1934) gives at p. 45 an index of nominal wages in France annually, 1887-1913. This is based on the following: 1887-1903, R. Kuczynski, *Arbeitslohn und Arbeitszeit in Europa und Amerika 1870-1909*, wage-rates for some 15 occupations in Paris and Lyons; 1887-1913, *Annuaire statistique*, wages in mines and sugar-refining; 1903-13, wage-rates reported by Maires and Conseils de Prud'hommes for the capitals of *départements*. J. Kuczynski's index is weighted by the numbers occupied.

5. *Annuaire Statistique*, 1946, pp. 224-5, average of hourly wage-rates in 38 male occupations reported by Maires and Conseils de Prud'hommes for the capitals of *départements* excluding Paris, 1896, 1901, 1906, 1911: the same as used in 4.

6. *Annuaire Statistique*, 1946, pp. 222-3: average hourly wage-rates in 22 occupations in the Paris region, according to reports of Conseils de Prud'hommes, for 9 years in 1862-1911.

7, 8, 9. (i), (ii), and (iv) cited under 2 above.

10. *Annuaire Statistique*, 1946, p. 227: average daily wage of minors, annually, 1860-1913.

11. *Annuaire Statistique*, 1946, p. 228: average daily wage of men in sugar refining, annually, 1881-2 through 1913-14.

12. *Annuaire Statistique*, 1946, p. 228: average daily wage of workers in tobacco manufacture, annually, 1893-1913.

(b) *Method*. Graphical comparison of the series in (a) suggested that 1 and 2 could be accepted as tracing the central tendency. Agreement between them is close except in 1875-90. The procedure then adopted was to use 1 and 2 to fix certain pegs, and to apply 3 and 4, as the only series of any breadth of coverage that provide annual figures, to give the pattern of year-to-year movements between one peg and another. The pegs were found by graphical interpolation between 1 and 2, at 1860, 1865, 1870, 1887, 1910. Series 3, from 1870 through 1887 only, was then subjected to a linear transformation, so that its ends were brought on to the pegs at 1870 and 1887; and series 4 was similarly strung between the pegs at 1887 and 1910; it was also extrapolated through 1913. The change to 4 was made at the earliest possible date because its coverage is wider than that of 3. Intermediate pegs were unnecessary, as where the two basic series lie somewhat apart, from 1870 to 1894, the strung index lies between them, and in 1894 it nearly coincides with them, while from 1894 onwards the two basic series follow nearly the same linear course.

(c) *Kind of wage*. Predominantly hourly and daily rates.

(d) *Wage-earners*. Industrial only; the trend of the index follows series 1 and 2 in (a) above, and these depend chiefly on rates collected for some 30 to 50 occupations in the capitals of *départements* and in Paris, but its year-to-year movements follow those of series based from 1870 through 1886 solely, and from 1887 onwards in great part, on Paris.

(e) *Weights*. Unweighted central tendency.

2. 1914-39

(a) *Source*. Following series, all from *Annuaire Statistique*, 1946, pp. 223-7: (1) Average hourly rate reported by Conseils de Prud'hommes for 22 occupations in the Paris region, 1911, and annually 1924-39. (2) Average hourly rate for 38 male occupations in the capitals of *départements*, excluding Paris, and towns in which Conseils de Prud'hommes sit: 1911, and annually 1921-39. (3) Daily wage of coal-miners, annual averages, 1911 and 1921-39.

(b) *Method*. Graphical comparison of the three series in (a) with other series, also given in *Annuaire Statistique* 1946, for the metal industry of the Paris region, for sugar-refining, and for tobacco manufacture, suggested that a combination of the three series would represent the general movement. These three series were combined with weights roughly proportionate to the populations of the areas in which the rates were reported. In 1931 we had (*Recensement* 1936, tome i, part 1, p. 29) population of Paris 2.9 m., and of all cities, other than Paris, with more than 10,000 inhabitants, 13.1 m.; while in the 1920's and '30's there were about 0.3 m. mine-workers (*Annuaire Statistique* 1935, p. 76, Table II). After the number of mine-workers had been multiplied to give a rough estimate of the population in the mining districts, these figures suggested the weights 3, 13, 1 for series 1, 2, 3 respectively.

(c) *Kind of wage*. Mostly hourly, some daily.

(d) *Wage-earners*. Men in industry in Paris and larger towns, and miners.

(e) *Weights*. Original series apparently unweighted means of component occupations; our index weighted as in (b).

B. Cost of Living

1. 1860-1913

Salaires et coût de l'existence à diverse époques, jusqu'en 1910 (Ministère du travail; Statistique générale de la France, 1911) gives:

(a) In Table 8, p. 58, the annual outlay, in francs, on food by a wage-earning family of four persons, and income 1,800-2,200 francs, 'un revenu moyen', annually, 1875-1910. The quantities used are those bought by 800 wage-earning families in Paris in 1908, together with an estimate for wine; the prices are those of a railway workers' co-operative. Estimates can be carried back to 1860 by means of Table 6, p. 55, which gives for 1835-1909 the annual outlay, in francs, on food and heat, of a carpenter's family of four persons, according to the quantities bought by such a family in 1856 and 1890, and the prices recorded by l'Assistance publique. This series was spliced with the first over the years 1875-80.

(b) In Table 27, p. 105, the annual *rent*, in francs, of a house of constant size and amenity, by decades, 1810 to 1910, with estimates for the years 1906, 1907, 1908, and 1910; other annual figures were estimated by linear interpolation.

Adding (a) and (b) we get a series in continuous form, which is then reduced to index-number form.

2. 1914-39

Annuaire Statistique, 1946, p. 107, gives:

(a) 1914-39, index of total cost at retail of fixed quantities of 13 household articles, of which 11 are food and 2 oil.

(b) 1927-40, weighted index of retail prices of 34 household articles, of which 29 are food, and 4 heating, lighting, and soap.

We used (a) through 1926, and continued with (b) from 1927 onwards, splicing over 1927-31. There is no entry for rent.

C. General Prices

1. 1860-1913. An index of wholesale prices has been published in the *Annuaire Statistique* from 1904, and is described, and repeated for 1857-1918, at pp. 203-5 of *Index Numbers of Wholesale Prices in the United States and Foreign Countries*,

Bulletin No. 284 of the U.S. Bureau of Labor Statistics, 1921 (66th Congress, 3rd Session, House Documents, vol. lxxii, No. 1035). We have taken the series for commodities other than food, and these are: iron semis, copper, tin, lead, zinc, coal, cotton, flax, hemp, jute, wool, silk, hides, tallow, vegetable oil, alcohol, petroleum, soda, indigo, timber, rubber. Down to 1906 all prices are import prices; from 1906 onwards they are average prices in French internal markets. The index is unweighted. This index has been combined with the indexes of wage-rates and of cost of living, with the weights 20, 20, 60 respectively, to give an index of general prices. A relatively high weight has been given to wage-rates because the wholesale prices are of semis or raw materials, not manufactures, and the cost of living index is mostly food.

2. 1913-39. Combination, with same weights as for 1860-1914, of cost of living and wage-rate indexes, with weighted index of wholesale prices of 87 industrial products, 1913, and annually 1926-40, in *Annuaire Statistique*, 1946, Tables XVI, XVIII. These industrial products comprise minerals and metals, textiles, leather, chemicals, rubber, paper, wood, and cement, and probably do not include much that is more than semi-manufactured.

D. National Income per Occupied Person

1. National income

1860-1911. No yearly estimates have been found, only estimates for isolated years, by different writers and with different coverage. These are listed by Colin Clark in his *Conditions of Economic Progress*, pp. 99-100, and he bases on them an estimate in continuous form of the national income of France by decades, 1860-9 through 1900-9, with 1911. We have used one of the sources cited by Clark, viz. F. Simiand, *Le Salaire, l'évolution sociale et la monnaie*, iii, 107. Simiand constructed indexes of the changes in each of five components of national income--incomes from property; from work in agriculture; from industry and commerce; from property and work jointly in agriculture; from property and work jointly in industry and commerce. These indexes are combined with weights proportionate to the relative sizes of the relevant components of national income, around 1890. This gives the following index of total income:

Years around					
1860	1870	1880	1890	1900	1910
65	..	92	91	104	135

The estimates for the components around 1890 are based on C. Colson, *Cours d'économie politique*, livre iii (1908) and Supplement to livre iii (1926). The Simiand index has the advantage of providing five estimates in continuous form within the span 1860-1910.

1913-38. Articles by L. Dugé de Bernonville in the *Revue d'Économie Politique* for 1935, 1937, and 1939, give estimates of aggregate private income in 1913 and annually from 1920. This aggregate is made up of the following elements:

- (i) Salaires et traitements
- (ii) Revenus des capitaux: (a) valeurs mobilières, (b) propriété bâtie
- (iii) Revenus mixtes (capital et travail): (a) agriculture, (b) industrie et commerce, (c) professions libérales
- (iv) Pensions et retraites.

Where the estimates in the articles of different years differ, that of the latest article has been adopted.

2. Occupied population

1860-1913. The figures given in successive census reports for the 'population active' appear to have been reached upon different definitions at different times. We therefore took the total of males and females aged 20-59 inclusive at each quinquennial

census from 1856 through 1911, from Census for 1911, vol. i, part II, p. 31. Estimates for intercensal years were made by linear interpolation.

1913-39. *Résultats Statistiques du Recensement Général de la Population 1936*, tome i, part 3, at p. 8, Table I, gives for census years 1921, 1926, 1931, 1936, figures for the 'population active' in 90 *départements*. Estimates were made for intercensal years by linear interpolation, and for 1937-9 by linear extrapolation of the change 1931-6. The estimate for 1913 was made by taking the estimated population aged 20-59 obtained above for 1913, and raising it by 0.1 m.; the above Table 1 in *Résultats Statistiques* gives no figure for the 'population active' in 1911, but for 1906 it gives 20.721 m., and the difference between this and the population aged 20-59 of highest 20-620 m. of the same year gives the basis of the above estimate for 1913.

E. Long-term Rate of Interest

Annuaire Statistique, 1946, Résumé rétrospectif, Table VIII, pp. 148-9: 'Cours des rentes françaises depuis 1798', quotations for 3 per cent. *rentes perpétuelles*; mean of and lowest prices for the year.

2. GERMANY

A. Wages

1. 1860-1911

(a) *Source*. Indexes given from 1860 for five industries, and from 1885 for eight, in J. Kuczynski, *Löhne und Ernährungskosten in Deutschland 1820-1937* (G. D. Meyer, Libau, 1937) at Table IX, pp. 38-41.

(b) *Method*. The following series were compiled: (i) a weighted index for 1871-1908 constructed from the data given by R. Kuczynski in his *Die Entwicklung der gewerblichen Löhne seit der Begründung des Deutschen Reiches* (G. Reinor, Berlin, 1909). The data given for each occupation in a number of areas were formed into an unweighted average of all areas, and these occupational averages were then formed into a single weighted average, using weights proportional to the numbers of persons in the several occupations in 1895 (same source as in (c) below). (ii) Weighted indexes of money wage-rates for 'Arbeiteraristokratie' 1868-1913, and 'grosso Masse der Arbeiter' 1879-1913, are given at pp. 27-8 of J. Kuczynski, *Die Entwicklung der Lage der Arbeiterschaft in Europa und Amerika 1870-1933* (Philographischer Verlag, Basel, 1934); sources listed at pp. 30-2. For the last third of the nineteenth century the main material used was that given in R. Kuczynski, *Arbeitslohn und Arbeitszeit in Europa und Amerika, 1870-1909* (J. Springer, Berlin, 1913). (iii) Index of average annual earnings, 1886-1900, of insured workers in building, mining, metal, textile, and chemical trades, quoted in *Report of the Board of Trade on British and Foreign Trade and Industry* (Cmd. 1761 of 1903). (iv) Weighted index calculated for 1860-1914 from indexes of wages by industries in J. Kuczynski (1937), see (a) above and (c), (d), (e) below. These indexes were graphed together, and it then appeared that the course of (iv) could be taken as fairly representative of the general movement.

(c) *Kind of wage*. Various; quotations mainly for daily and weekly rates were combined by J. Kuczynski with some annual earnings to form an index number for each industry.

(d) *Wage-earners*. From the following industries, the figure in brackets showing the number of occupations comprised: building (3); metals (12-14); textiles (17); wood (5); printing (1); chemicals (1); transport (4); mining (3); including some unskilled, and some series of average earnings of all grades, but, except in the last three categories, the skilled predominate.

(e) *Weights*. The original industrial indexes were in part weighted in proportion to the numbers occupied, but mostly unweighted. In our final composite index the

weights are constant, and proportional to the numbers of all occupied in the industries concerned, according to the Industrial Census of June 1895, reported in Table V. 1 at pp. 31-9 of *Statistisches Jahrbuch für das Deutsche Reich*, 1899, viz. (figures give numbers in thousands): building 1,046; metals 794; textiles 993; wood 329; printing 81; chemicals 115; transport 230; mining 536.

2. 1913-37

(a) *Source*. *Statistisches Jahrbuch für das Deutsche Reich* gives tables of average rates of 'tarifliche Stundenlöhne'. The calculation of these average rates from 1928 onwards is described in *Vierteljahrshefte zur Statistik des Deutschen Reichs*, Jahrgang 1931, Heft 2, pp. 94-109. The figures used here are drawn as follows: for 1913-24, *Jahrbuch* 1928, p. 371, 'alle Gewerbegruppen, tarifmassige Stundenlöhne'; for 1925-9, *Jahrbuch* 1930, p. 229, first two columns (monthly rates averaged to give annual figures); for 1928-37, *Jahrbuch* 1938, p. 339.

(b) *Method*. Construction of national averages as under (c). The two series, 1913-27 and 1928-38, were joined to each other according to their average relation in the two years 1928-9 for which the earlier series was continued alongside the new one.

(c) *Kind of wage*. Standard hourly rates; and piece-rates used to yield the normal hourly earnings of the representative worker.

(d) *Wage-earners*. 1913-27, in coal, metals, chemicals, building, timber, paper, printing, textiles, brewing, confectionery and baking, cardboard-box making, railways; 1928-38, the above, together with lignite, paper-using industry (shown separately from paper production), china, clothing, shoes, post office. Down to 1928 separate average rates are given for 'gelernte' and 'ungelernte'. Beginning with 1928, separate average rates are given, for men, for 'Facharbeiter', 'angelernte Arbeiter', and 'Hilfsarbeiter', and, for women, for the first of these two types together, and for the third. The wage-earners are fully employed workers earning the highest rate provided in the scale giving different rates for workers of different ages: this highest rate was usually reached at the age of 20-22.

(e) *Weights*. In the original sources, rates in one industry in different districts were combined to give an average for the industry, and the industrial averages were combined to give a general average, by using in each case the relevant numbers employed. For the average rates down to 1928 it is not known what was the source of these weights, or whether they were fixed. From 1928 onwards the weights used in the general averages were the numbers actually occupied in each industry, after deducting the unemployed, on the average of the years 1928-30: see *Vierteljahrshefte zur Statistik des Deutschen Reichs*, Jahrgang 1931, Heft 2, where Table 8 (p. 101) gives the numbers occupied by industries, and Table 3, pp. 96-7, gives the proportions of different types of labour (M. and F., skilled and unskilled, &c.) within each industry. Weights from these sources were also used by the present authors to combine into one national average the two average rates given in the *Jahrbuch* down to 1928, and the five average rates given for 1928 onwards—see under (d) above. For the years down to 1928, where only two categories, skilled and unskilled, were given, it was assumed that the weight appropriate to the skilled was given by the sum of the numbers of 'Facharbeiter' and 'Angelernte' in the above-mentioned Tables 3 and 8.

B. Cost of Living

1. 1860-1913/14

The following indexes were compared:

(a) 1860-89. J. Kuczynski, *Löhne und Ernährungskosten in Deutschland 1820-1937* (Libau, 1937), index of cost of food, at p. 43. Series for Prussia, Munich, and Darmstadt are combined with the weights 10:1:1. The Prussian index down to 1873 used wholesale prices, and from 1873 onwards mostly retail prices. In each of these periods it was weighted with assigned weights such as wheat 2, rye 3.

(b) 1887-1914. J. Kuczynski, *Die Entwicklung der Lage der Arbeiterschaft in Europa und Amerika 1870-1933* (Basel, 1934), index of cost of living, at pp. 27-8 and 32-3. For 1887-9 a weighted index of the price of six foods was used. For 1890-1900 the index combines material given for six cities in *Schriften des Vereins für Sozialpolitik, Kosten der Lebenshaltung in deutschen Grossstädten*, with material given for Berlin by Gustav Brulzer in his *Die Verteuerung der Lebensmittel in Berlin im Laufe der letzten 30 Jahre* published by the same Verein. For 1900-12 the material is found in figures for three cities in the above-mentioned *Kosten der Lebenshaltung*, and in the figures given for Prussia by Carl von Tyszkä, *Lohn- und Lebenskosten in Westeuropa im 19. Jahrhundert*. For 1913 and 1914 the index was formed in the same way as for 1887-9. All the above materials seem to have been made up only of food prices, but Kuczynski states that he also took rent into account, according to the data given in the above-mentioned *Kosten der Lebenshaltung* and in R. Kuczynski, 'Einkommen und Miete' (*Vierteljahrsberichte des statistischen Amtes der Stadt Schöneberg*, iii, 1910, Heft 2); he does not say how he combined the rents with the food prices.

(c) *Report of the Board of Trade on British and Foreign Trade and Industry*, Cmd. 1761 of 1903; index 1877-1901 of the retail prices of food, based on prices charged in the co-operative store in Krupp's works at Essen, and weighted according to the relative outlay on each article in the budgets reported in *Expenditure of Working Class Families* (6th and 7th annual reports of the U.S. Commissioners of Labor, Washington, 1891 and 1892).

(d) Costs of living (household costs) of a German wage-earning family, in Prussia, and in Munich, for various periods from 1858 to 1912, in C. von Tyszkä, work cited in (b) above. In the years from 1887, for which all four series are available, they show fair agreement, except that (c) has a sharper peak in 1891. In the years before 1887, there is fair agreement between (a) and (d). As our index we took (a) for the earlier years (as the only continuous index available then), and (b) from 1891 onwards, connecting the two at that point because when expressed as relatives to 1890-9 they had practically the same value in 1890. It must be remembered that through 1890 the index remains one of food prices alone.

2. 1913/14-38

Reichsindexziffer für die Lebenshaltungskosten, taken from *Statistisches Jahrbuch für das Deutsche Reich*, 1938, p. 331. The index covers food, rent, heat, and light, clothing, and miscellaneous, with fixed weights given by the quantities bought by a representative wage-earning family of five persons.

C. General Prices

1. 1860-1912. Weighted average of the series for cost of living and wage-rates (see above for both), with prices of industrial raw materials. The weights are, respectively, 60, 20, 20, and were chosen as an approximation to the composition of final buying; a smaller weight is given to the cost of living than in some other countries because through 1890 it consists only in food prices, and from 1891 only in food prices *cum* rent; the weight given to wage-rates is meant partly to offset this limitation of the cost of living series and partly to offset the restriction of the industrial series to raw materials. The index of prices of industrial raw materials is taken from *Statistisches Jahrbuch für das Deutsche Reich*, 1936, pp. 283-4, 11, 'Industriestoffe', and is the weighted average of the series given there in cols. 6-13 for coal, iron, non-ferrous metals, textiles, hides, chemicals, oils and fats, building materials. The weights are proportional to annual consumption, and the resultant index is a chain index.

2. 1913-37. Weighted average of the series for cost of living and wage-rates (see above) and prices of industrial raw materials. The weights are, respectively, 70, 15, 15; the weights differ from those of 1860-1912 because the cost of living

index now has a wider coverage. The series for prices of industrial raw materials is the same as in 1860-1912, and the components are taken from *Statistisches Jahrbuch für das Deutsche Reich*, 1938, p. 321.

D. National Income per Occupied Person

1. National income

1872-1913. Einzelschriften zur Statistik des Deutschen Reichs, No. 24, *Das deutsche Volkseinkommen vor und nach dem Kriege*, at pp. 30-2, gives estimates of the income of Prussia annually 1891-1913 and of Saxony for 1877, 1878, and alternate years beginning with 1879 and ending with 1913. 'By national income or social product we understand the aggregate of such goods and services as are valued in terms of money, which in a given year are at the disposal of the economy for consumption and investment, after provision has been made for the maintenance of existing equipment' (ibid., p. 11). But the estimates here are for 'uncorrected income', that is, 'the assessed incomes of natural persons (inclusive of free board and allowances) together with the income below the tax exemption limit . . .; without adjustment for income not assessed because subject to allowances, for under-assessment, for undistributed corporate incomes, for the earnings of public enterprise, and for the social insurance contributions deducted before arriving at assessable income' (ibid., p. 30). For Prussia, income below the income-tax exemption level seems to have been estimated throughout by assigning to the relevant number of occupied persons an average income of 800 marks a year in the country and 665 marks a year in the towns (ibid., p. 31). In *Übersichten der Weltwirtschaft* (founded by F. X. von Neumann-Spallart), VI Band by F. von Juraschek (Berlin, 1896), at pp. xx, xxi, there are given estimates of the national income of Prussia annually 1872-82, with 1885, 1888, 1890; and of Saxony for 12 years within 1875-94. The estimates for Prussia are drawn from the following works of Dr. A. Soetbeer: *Umfang und Verteilung des Volkseinkommens im Preussischen Staate 1872-1878* (Leipzig, 1879); 'Preussisches Volkseinkommen im Jahre 1882', in *Conrads Jahrbücher* 1882, p. 237; 'Zusammenstellungen aus den Veranlagungen zur Einkommensteuer im Jahre 1876, 1888', in *Conrads Jahrbücher* 1889, p. 161. The estimates for Saxony are from Dr. V. Boehmert, 'Die sächsische Einkommensteuer-Statistik von 1875-1894', in *Zeitschrift des Kgl. sächsischen statistischen Bureaus* 1894, III and IV, p. 201. Of the national income of the Reich in 1913, Prussia is estimated to have accounted for 62 per cent. and Saxony for 9 per cent. (*Das deutsche Volkseinkommen*, op. cit., p. 30, Table 1.) On graphical comparison of these materials, it seemed best to take the national income of the Reich as varying proportionately to the estimates for Prussia for 1872-90 and 1897-1913, and to those for Saxony in the bridge 1891-6 between the Soetbeer and post-war estimates. The bridge was made as follows: The estimate for Prussia bore to that for Saxony the ratio 6.69 in 1890 and 7.11 in 1897. The estimates for Saxony were raised by the following multipliers: 1891, 6.75; 1892, 6.81, and so on, rising by 0.06 annually, to 7.05 in 1896. The products were taken as continuous with the estimates for Prussia through 1890 and from 1897.

1913-37. For 1913 and 1925-31, estimates in continuous form, for the post-war Reich area, are given at p. 69, Table 9, of *Das deutsche Volkseinkommen* (op. cit.). *Statistisches Jahrbuch des Deutschen Reichs*, 1938, p. 559, repeats the same figure as the preceding source gives for 1913, gives slightly adjusted figures for 1929-31, and adds estimates for 1932-7. The first source was used for 1913 and 1925-8, the second for 1929-37.

2. Occupied population

1872-1914. *Statistik des Deutschen Reichs*, Band 408, 'Berufszählung von 16 Juni 1925', p. 9, Table 1, gives the following percentages of total population classified as occupied, in census years: 1882, 42.4; 1895, 43.0; 1907, 45.7; 1925, 51.3. For

intercensal years the corresponding percentages were obtained by linear interpolation, and the (linear) rate of change from 1882 to 1895 was carried back to 1872. These percentages were applied to annual figures of total population, given in *Statistisches Jahrbuch für das Deutsche Reich*, 1914, at p. 2, Table 3.

1913-38. Changes in occupied population were assumed proportionate to changes in total population of working age, here taken as age 15-59 inclusive, within the territory of the post-war Reich, excluding the Saar. Source: *Die Bevölkerung des Deutschen Reichs nach den Ergebnissen der Volkszählung 1933*, Heft 2, p. 10, giving age-distribution for census years 1910, 1925, 1933; intercensal years by linear interpolation.

E. Long-term Rate of Interest

1870-1913. Lindahl, *National Income in Sweden*, i. 264, gives weighted averages of yield of German Government and Mortgage Bank Bonds; originally from O. Donner, 'Die Kursbildung am Aktienmarkt' (*Vierteljahrsheft zur Konjunkturforschung* 1934, Sonderheft 36).

1925-37. *Statistisches Jahrbuch für das Deutsche Reich*, 1933, p. 362, '6% Wertpapiere, Pfandbriefe der Hypoth.-Akt.-Banken, 1925-7', and 'Rendite der 6-prozentigen Pfandbriefe, 1928-30'; 1938, p. 422, 'Rendite der 4½-prozentigen Pfandbriefe, 1931-7'.

3. SWEDEN

A. Wages

1. 1861-1913

(a) *Source*. *Wages, Cost of Living, and National Income in Sweden, 1860-1930*, vol. ii, *Wages in Sweden, 1860-1930*, by G. Bagge, E. Lundberg, and I. Svernilson (London, P. S. King, 1933), pt. i, Table 3, p. 53, and Table 5, p. 62.

(b) *Method*. Firms were selected which had good continuous wage records, and in each such firm 'the investigation has been confined to a small number of selected workers from representative occupations'. These individual series were combined to give an average series for the firm; 'according as such series show a concordant tendency, they have been combined into averages' (Bagge et al., op. cit., bk. i, c. ii). 'The average hourly earnings . . . are of a very summary character. In the case of a large number of annual earnings series there are no particulars as to hours of work, and it has been impossible to make an exact calculation of the hourly earnings. Such averages of hourly earnings as have been computed for specific branches of industry are therefore based on a far smaller number of series than the averages of annual earnings. The hourly earnings within the group iron and steel and engineering are based entirely on estimates. . . . Notwithstanding the comparative scarcity of the material available, the trends of the hourly and annual earnings show a very close agreement, if due regard is paid to the change in hours of work per annum.' (Ibid., bk. i, c. iii, p. 52.)

(c) *Wage-rate*. Hourly earnings, obtained by dividing the actual total earnings of each group of workers by the number of hours they worked.

(d) *Wage-earners*. Men only, in iron and steel; engineering; saw-mills (from 1885 only); wood-pulp (from 1895 only); paper-mills; food products (from 1861 only); textiles (from 1865 only); remainder group drawn from among mining, quarries, leather, rubber, and chemicals (from 1887 only).

(e) *Weights*. Constant; proportional to the numbers of male employees around 1913 in each branch of industry, with some allowance for the relative reliability of the series (Bagge et al., op. cit. p. 47).

2. 1914-39

(a) *Source*. Bagge et al., op. cit., Table 26, p. 261, using material from the annual inquiry into wages by the Social Board, published 1919-28 in *Sociala Meddelanden* and from 1929 in the *Lönstatistisk Årsbok för Sverige*; continued for 1931-9 by our own calculations in the same form from the same data in the *Lönstatistisk Årsbok* for later years.

(b) *Method*. To maintain comparability with their series for 1861-1913, Bagge, Lundberg, and Svennilsson take from the annual wage inquiries of the Social Board the wages of men only, in those industries alone which were covered in the earlier years.

(c) *Wage-rate*. Hourly earnings, obtained by dividing the actual total earnings (including overtime and payments in kind) of each group of workers by the number of hours they worked.

(d) *Wage-earners*. Men only, in mining and metal manufacturing; minerals and stone; wood products; paper; food products; textiles and clothing; leather, fur and rubber; chemicals.

(e) *Weights*. Constant, proportional to the numbers of male employees in 1913 in each branch of industry (see Bagge et al., op. cit., p. 256).

B. Cost of Living

1. 1861-1913. (i. Myrdal, *The Cost of Living in Sweden 1830-1930*, Table A at pp. 197, 199. Budget B, based on national average consumption for 1881-90. Weights: foodstuffs 55, fuel 3, lighting 1½, clothing 12, housing 10, miscellaneous 18½.

2. 1914-39. Official cost of living index, 'Socialstyrelsens levnadskostnadsindex åren 1914-1948', based on the outlay of a normal household with a budget of 3,500 kroner in 1935. Given in *Statistisk Årsbok för Sverige*, 1948, p. 220, Table 173.

C. General Prices

1. 1861-1913. Weighted average of the series for cost of living and wage-rates (see above) and prices of industrial raw materials (see later). The weights are, respectively, 70, 15, and 15, and were chosen as an approximation to the composition of final buying. The index for prices of industrial raw materials is taken from Bagge et al., *Wages in Sweden, 1860-1930*, pt. ii, p. 240, Table 190, col. 8. It is the (apparently unweighted) mean of the price indexes of the nine most important raw materials and semi-finished products, viz. copper, pig-iron, bar-iron, coal, firewood, boards, wool, cotton, hides. The price of cotton was excluded for the years of the cotton famine, 1860-6. See Bagge, op. cit., p. 252.

2. 1914-39. Weighted average of the series for cost of living and wage-rates (see above) and wholesale prices. The weights are, respectively, 70, 10, and 20. These weights differ from those of the earlier period because instead of an index of prices of industrial raw materials we now use the index of wholesale prices, which covers more manufactured products, and therefore itself contains more effect of wage-rates. The wholesale price index is that of the *Kommerskollegii*, quoted in the *Statistisk Årsbok för Sverige*, 1930, p. 226; 1935, p. 218; 1939, p. 230. We have used the most comprehensive form (*sumtliga varor*) which covers: chemicals, rubber products, leather, textiles, paper, wood, cement, glass, metals, fuel, fats, fodder, animal and vegetable products. The index is weighted, but the weights are not stated.

D. National Income per Occupied Person

1. *National income 1861-1930*. From E. Lindahl, E. Dahlgren, K. Kock, *National Income of Sweden, 1861-1930*, at p. 234 of part i, alternative I.

1931-4. In Lindahl et al., op. cit., part i, p. 317, a note on National Income 1930-4 states that an estimate of the national income made in the Dept. of Finance

for the years 1930-4 showed an 8 per cent. difference from the Lindahl estimate for 1930, but was made on the same main principles, and the two series may be regarded as comparable. The series from the Dept. of Finance has therefore been used as an index to carry Lindahl's series forward through 1931-4.

1935-9. Estimates of Konjunktur institutet, communicated by K. Koek, here lowered by 1%, which makes them agree in years before 1935 with the estimates used here for those years.

2. Occupied population

(a) 1861-1914. Total population, M. and F., aged 15-64 inclusive; from Lindahl et al., op. cit. at pp. 4-5 of part ii, estimates from official Population Statistics.

(b) 1914-39. Total population, M. and F., aged 15-59 inclusive; from *Statistisk Årsbok för Sverige*, 1918, at p. 9, Table 8 - census years only. Inter-censal years by linear interpolation.

E. Long-term Rate of Interest

1887-1930. Bagge, Lundberg, and Svennilson, *Wages in Sweden 1860-1930*, pt. ii, p. 259, yield of certain Swedish government bonds. Originally from *Svensk Sparbankstidskrift*, 1931, p. 825.

1931-9. Long-term rate on State bonds, from Yearbook of Swedish National Debt Office (Riksgäldskontorets Årsbok).

4. UNITED KINGDOM

A. Wages

1. 1860-1910

(a) *Sources*. G. H. Wood, *J.R.S.S.*, March 1909, 'Real Wages and the Standard of Comfort since 1850', Appendix, pp. 102-3, 'Money wages for workman of unchanged grade, in full work'. Continued for 1903-10 from figures communicated by Mr. Wood to Professor Bowley and given in Bowley, *Wages and Income in the U.K. since 1860*, Table I, col. 4.

(b) *Method*. Combination of Bowley's previously published estimates with new estimates for agriculture, cotton, coal, puddling, gas, and furniture. 'The inclusion of railway servants, domestic servants, the clothing trades, and one or two other large industries which we cannot, for want of material, trace in sufficient detail, would probably affect the final result; but it is improbable that the effect would be very great, as the numbers already included are so large.' The same materials when used by Wood to give an index number of wages allowing for change in numbers in occupations show results which differ from Bowley's own index (Bowley, op. cit., Table I, and table headed 'General movement of average wages, 1860 to 1880' at p. 10) by as much as 8 points at the most (in 1900) but generally only by 3 to 5 points, Bowley's always being the higher.

(c) *Wage-rate*. Approximation to hourly rates. The original series, which was given in shillings per week, seems to have given the rate of pay for a full normal week. But it appears that in the early 1870's the Saturday half-holiday came in, and there was a reduction from about 60 hrs. to 56½ hrs. (textiles 1874) or 54 hrs. (engineering 1871); for building, the Saturday half-holiday came in 1873 (see Bowley, op. cit., pp. 25-6). Assuming this movement general, and accomplished without reduction in the total payment for the normal working week, we have a rise of about 10 per cent. in hourly rates. To adjust to hourly rates, the original series has therefore been lowered by 2½ per cent. in 1874, 5 per cent. in 1873, 7½ per cent. in 1872, and 10 per cent. in 1871 and each preceding year. 'After the introduction of the Saturday half-holiday there was very little change till the almost universal reduction in 1919 or 1920' (Bowley, loc. cit.).

(d) *Wage-earners*. In various occupations in the following industries: agriculture (including Ireland); building; printing; shipbuilding; engineering; coal; puddling; cotton; wool and worsted; gas; furniture.

(e) *Weights*. Apparently, relative numbers employed about 1850.

2. 1911-14. Labour Dept. index (*18th Abstract of Labour Statistics*, p. 120; see also Bowley, *Wages and Income in the U.K. since 1860*, Table I, col. 3) spliced with preceding series over the years 1906-10. Unweighted average of series for building, coal, engineering, textiles, and agriculture.

3. 1914-39

(a) *Source*. A. L. Bowley, *Wages, Earnings and Hours of Work, 1914-1917, United Kingdom* (London & Cambridge Economic Service, Special Memo. No. 50, May 1947), Index Number of Wage Rates, p. 7; figures for the years 1915-18 inserted from A. L. Bowley, *Prices and Wages in the U.K. 1914-1921*, Table XXXIII, p. 106, taking the mid-points of the 5-point spans of the 'general rough averages' given. The estimates for 1914-20 were adjusted as stated in (c) below.

(b) *Method*. Series selected to give appropriate proportions of skilled and unskilled, men and women, time-rates and piece-rates.

(c) *Wage-rates*. 'The intention was to show average wages for a week of normal working hours and was mainly based on time-rates; but for textiles and coal-mining payment by piece was common, and some compromise had to be made to relate figures partly based on earnings with normal rates.' It is assumed that changes in normal weekly hours through 1921-39 were so small that an index of weekly rates for these years will serve also as an index of hourly rates. But in 1919 and 1920 normal weekly hours were generally reduced from about 55 to 48 or less (Bowley, *Wages and Income in the U.K.*, pp. 25-6). To make our index for the earlier years comparable with that for 1921-39 as an index of hourly rates, the original (weekly rate) entry for 1920 has been reduced in the proportion of 48 to 51, and that for 1919 and all preceding years in the proportion of 48 to 55.

(d) *Wage-earners*. Adults only, both men and women: 1914-24, bricklayers, bricklayers' labourers, compositors, dock labourers, engineering fitters, engineering labourers, railwaymen, cotton, wool, agriculture, coal; beginning with 1925 also including shipbuilding, local authorities' labourers, trams, lorries, and women in boots, confectionery, tailoring, shirtmaking, and tobacco.

(e) *Weights*. 'Based primarily on the wage-bills at the end of 1924, but modified to balance coal and agriculture against other occupations, and also to include men and women in due proportion' (see Special Memo, No. 28, of the London & Cambridge Economic Service, Jan. 1929).

B. Cost of Living

1. 1860-1914. Bowley, *Wages and Income in the United Kingdom*, Table XVII, p. 121 and p. 122. Weighted average of series for food, rent, clothing, fuel, and sundries, with weights as in the Ministry of Labour's Cost of Living index, 1914-39. For the years before 1880, estimates of retail prices are made by extrapolating the regression of the cost of living on wholesale prices of food and materials, which alone are available in the earlier years.

2. 1914-39. Ministry of Labour, Cost of Living index number as reported in *Abstracts of Labour Statistics* and *Statistical Abstracts*. See *The Cost of Living Index Number, Method of Compilation* (1937). Weights proportionate to outlays shown by wage-earners' budgets 1903-4 adjusted to show the corresponding outlays at the prices of 1914.

C. General Prices

1860-1939. A weighted index of cost of living, wage-rates, and prices of finished export goods, the latter being used as an index of the price of manufactured goods.

The weights of 70, 10, and 20 were assigned as an approximation to the proportionate composition of final buying. The index of the prices of finished export goods is that of Dr. W. Schlote, at p. 180, col. 7, of his *Entwicklung und Strukturwandlungen des englischen Aussehandels von 1700 bis zur Gegenwart*, continued for 1934-8 by the Board of Trade index of average values, quoted in Schlote, and here spliced with Schlote's index over 1929-33. These figures, from 1870, will also be found in *Bulletin of the Oxford University Institute of Statistics*, vol. x, No. 11, Nov. 1948.

D. National Income per Occupied Person

1. National income

1860-9. Bowley, *Wages and Income in the U.K.*, Table XV, at p. 97, gives estimates of the sum of income paying income tax, and wages, for 1860-4 and 1865-9. The corresponding figures for 1870-4, 1875-9, and 1880 were found to amount to 90.4, 93.7, and 93.2 per cent. respectively of A. R. Prest's estimates (see later) of the whole national income for the same years; Bowley's estimates for the two periods in the 1860's were then raised in the ratio 100:92 to give an approximation to the full national income in a form continuous with Prest's.

1870-1939. A. R. Prest: 'National Income of the U.K., 1870-1946', in the *Economic Journal*, March 1948, at p. 57, col. 6. These estimates are exclusive of Southern Ireland with effect from 1920. In the 1914-39 series (but not in 1860-1914) Prest's estimate for 1914 has been reduced by 3.6 per cent. to give an estimate for Great Britain and Northern Ireland alone. The 3.6 per cent. is derived from Bowley and Stamp, *The National Income in 1924*, p. 47—social income for the whole United Kingdom 1911, £m. 2,062; correction for Southern Ireland £m. 74.

2. Occupied population

1860-1914. For census years, 1881-1911, estimates of the occupied population of the U.K. are given by Bowley, *Wages and Income in the U.K.*, p. 91. An estimate for 1871 was made by applying to the actual total population aged 15-65 inclusive of that year the ratio (70.4 per cent.) which Bowley's estimated occupied population bore to the corresponding age-group total of 1881. Estimates for intercensal years were made by linear interpolation, and the years before 1871 and after 1911 were dealt with by linear extrapolation of the rate of change in the adjacent decade.

1914-23. A. L. Bowley, *Studies in the National Income 1924-38*, gives at pp. 54-5, Table I, the ratio of occupied persons to all persons, by age- and sex-group, for census years 1911-31. By linear interpolation and extrapolation the corresponding ratios for years other than census years were estimated. These ratios were then applied to the total population in each age- and sex-group, as given by *Statistical Abstract*, 1936, pp. 14-15, for Great Britain only. The products were raised by 1.0288 (see Bowley, loc. cit.) to include an estimate of the occupied population in Northern Ireland. Thus Southern Ireland or Eire is excluded throughout, though not politically separated until 1921.

1924-38. A. L. Bowley, *Studies in the National Income 1924-38*, at p. 56, Table II, gives estimates of occupied population which were obtained by applying to the population of each age- and sex-group the ratio of occupied shown by the census of 1931.

E. Long-term Rate of Interest

1860-1930. Bagge, Lundberg, and Svennilson: *Wages in Sweden 1860-1930*, pt. ii, p. 259, yield of British Consols (2½ per cent.).

1931-9. Bank of England *Statistical Summary*, prices of 2½ per cent. Consols.

5. UNITED STATES OF AMERICA

A. Wages

1. 1860-1913

The index presented here consists, (i), for 1860-89, of a calculation from the original data of the Aldrich Report, and, (ii), for 1890-1913, of Douglas's index of hourly rates. But these results may be compared with (iii) a continuous index of wage-rates made by the Bureau of Labor Statistics.

(i) 1860-89

(a) *Source.* Aldrich Report, *Wholesale Prices, Wages and Transportation*. Report by Mr. Aldrich from the Committee on Finance, U.S. Senate, 52nd Congress, 2nd Session, Report 1394; Appendix A, Report of the Statistician, Professor Roland P. Falkner, Tables 37, 40.

(b) *Method.* Our index may be compared with three others: (1) The Bureau of Labor Statistics Index, described under (iii) below. (2) For the years 1860-80, Wesley Mitchell constructed from the Aldrich Report returns a comprehensive index in which each series was weighted year by year by the number of employees returned in each year (*Gold, Prices and Wages under the Greenback Standard*, Table 37, and pp. 94-5). We have followed Mitchell only in using the numbers returned as weights in the forming of the index for each industry from the various occupations in it, though instead of changing the weights, as he does, with the numbers returned year by year, we have used the numbers of 1870-9 as fixed weights throughout. We have not followed him in using the numbers of employees returned in the several industries as weights for the comprehensive index, but have preferred to use as weights the total numbers occupied in the several industries. (3) Falkner calculated an index for each industry simply by averaging the indexes for all occupations in it, so that each occupation was given an equal weight. Since the wages of foremen and specialists generally did not move so much as those of the more numerous lower paid workers, Falkner's indexes for industries do not move so much as those calculated by the methods of Wesley Mitchell or the present study. Falkner combined his indexes for industries to form a comprehensive index in two ways—a simple unweighted mean, and a weighted mean, in which the weights were derived from census figures of the numbers occupied in the different industries, and changed each five years. (See also (d) and (e).)

Table A compares our comprehensive index with that of Wesley Mitchell and with Falkner's weighted index; 1860 = 100.

Connexion with index for 1890-1913. Our index was continued through 1891, and was multiplied throughout by the ratio of the sum of the values in 1890-1 of the index for 1890-1913, to the corresponding sum for our index.

(c) *Kind of Wage.* Daily rates; as 'average daily earnings have been given for piece-workers where possible' (see note at head of Table XII of Exhibits, in Part II of the Report).

(d) *Wage-earners.* See Table 37 of Falkner's report, and Table XII of Exhibits. The returns used are all those which are given in index-number form in Table 37, except a few fragmentary series, and all series in three industries: City Public Works, which Wesley Mitchell regards as unrepresentative of business conditions (*Gold, Prices and Wages under the Greenback Standard*, c. IV, v. a); Dry Goods, in which only one store reported; and White Lead, for which no figures of numbers occupied are available in the period from which the weights are drawn. The returns used are summarized in Table B.

The coverage of the Aldrich Report returns is discussed by Wesley Mitchell (*Gold, Prices and Wages under the Greenback Standard*, c. IV, v. a), who points out: (1) They are confined to New England and North Atlantic States: 'According to the tables

TABLE A

<i>Year</i>	<i>Present Study</i>	<i>Bureau of Labor Statistics</i>	<i>Mitchell</i>	<i>Falkner</i>
1860	100	100	100	100
61	102	102	101	101
62	108	105	103	103
63	118	112	118	111
64	135	128	137	126
65	153	148	154	143
66	160	156	163	156
67	170	161	168	164
68	172	166	168	165
69	177	169	178	167
1870	175	172	162	167
71	175	174	164	166
72	175	177	167	167
73	175	177	167	166
74	170	172	163	163
75	163	172	158	158
76	153	164	152	151
77	143	156	146	144
78	140	153	143	141
79	140	151	140	139
1880	146	153	143	143
81	156	159	..	151
82	159	161	..	153
83	161	164	..	159
84	162	164	..	155
85	163	164	..	156
86	163	164	..	156
87	164	172	..	157
88	166	172	..	158
89	167	174	..	163
1890	168	177	..	168
91	168	177	..	169

based on *Week's Report*, relative wages in the North Central States were somewhat higher during the war and somewhat lower during the '70's than in states east of Ohio. . . . Regarding wages in states south of the Potomac and west of the Mississippi we have practically no information.' (2) They cover only a limited number of industries and occupations, the main gaps being agriculture and the clerical occupations. (3) The effects of including returns for the gaps, in area and in occupations, would to some extent offset each other. 'Whatever modifications the table would undergo, could they be made all-inclusive, would be modifications only in degree of movement, and these modifications in degree would probably be small in comparison with the scope of wage changes as a whole.' As to coverage within establishments reporting, the following note stands at the head of Table XII of the Exhibits, in which the original returns are given (Aldrich Report, part ii, p. 293): 'In certain establishments the pay-rolls failed to show daily rates for all occupations, hence while most of the establishments here presented are substantially complete, very few are actually so, and some exhibit only leading occupations. The following may be said in explanation of this condition of affairs: Average daily earnings have been given for piece-workers where possible, but in many instances no record of time was kept and it was, therefore, impossible to give such earnings. In many of these cases it

TABLE B

<i>Serial</i>	<i>Industry (1)</i>	<i>No. of establishments (2)</i>	<i>No. of occupations (3)</i>	<i>Total no. of employees covered av. 1870-9 (4)</i>	<i>Location of establishments (5)</i>
1.	Agricultural implements	1	5	28	Mass.
2.	Ale, beer and porter	1	5	48	N.Y.
3.	Books and newspapers	3	14	196	Conn., N.Y.
4.	Building trades	21	25	524	Conn., Mass., Md., N.J., N.Y., Pa.
5.	Carriages and wagons	1	4	24	N.Y.
6.	Cotton goods	4	81	994	Mass., N.Y.
7.	Illuminating gas	4	15	389	Mass., N.Y., Ohio.
8.	Leather	2	16	74	Mass.
9.	Lumber	2	5	32	N.H., N.Y.
10.	Metals and metallic goods	18	35	1,060	Conn., Mass., Md., N.H., N.J., N.Y., Pa.
11.	Paper	1	7	30	Mass.
12.	Railroads	1	11	322	Mass.
13.	Stone	4	13	536	Conn., Md., N.Y., Pa.
14.	Woollen goods	3	43	333	Conn., Mass., R.I.
15.	TOTAL	66	279	4,590	

was also impossible to secure a piece rate, owing to lack of uniformity in the description of the unit during the various years. In addition to these, such occupations as were considered not strictly industrial and in which the rates of pay were very irregular, as officials, clerks, etc., were omitted. In a few instances the condition of the pay-roll itself made it impossible to secure a complete presentation of certain occupations. The occupations, however, which are given are substantially complete.'

(e) *Weights.* The indexes for the different occupations recorded in each industry were first combined to give an index for the industry, using as constant weights throughout the average numbers returned in the several occupations through 1870-9. The industrial indexes were then combined to give a single comprehensive index, using as constant weights throughout the numbers of persons occupied in the several industries in 1870 (Appendix A to Aldrich Report, Table 40), viz. (numbers in brackets in '000s): Agricultural Implements (4); Ale, Beer and Porter (11); Books and Newspapers (40); Building (559); Carriages and Wagons (42); Cotton Goods (112); Illuminating Gas (2); Leather (29); Lumber (18); Metals and Metallic Goods (81); Paper (13); Railroads (154); Stone (26); Woollen Goods (78).

(ii) 1890-1913

(a) *Source.* P. H. Douglas, *Real Wages in the U.S. 1890-1926*, Table 73.

(b) *Method.* See *ibid.*, pt. ii, esp. c. v.

(c) *Kind of Wage.* Hourly earnings, including some piece-workers' earnings expressed as hourly rates.

(d) *Wage-earners*: in 'industry as a whole', comprising the following 'industry groups', with the numbers employed, in 1892, to the nearest 25,000:

All manufacturing . . .	4025	Coal miners . . .	350
Building trades . . .	1175	Postal employees . . .	25
Unskilled labor . . .	1800	Federal employees . . .	25
			<hr/>
			7,400

(e) *Weights*. Proportional to numbers employed in 1890.

(iii) 1860-1913

(a) *Source*. Bureau of Labor Statistics, *Monthly Labor Review*, xii. 2, Feb. 1921, p. 73, and xlii. 3, Mar. 1936, p. 717.

(b) *Method*. 'The index is a composite of all satisfactory data available.'

(c) *Kind of wage*. 'Average wage-rates or earnings per hour for wage-earners actually at work.'

(d) *Wage-earners*. 'Wage-earners of the country as a whole (exclusive of agricultural wage-earners).'

(e) *Weights*. Not stated.

2. 1914-39

(a) *Sources*. Bureau of Labor Statistics, *Monthly Labor Review*, xlii. 3, Mar. 1936, p. 717, gives an index of wages per hour, 1840-1934, and this index is also given in *Statistical Abstract of the U.S. 1936*, p. 312, Table 353, which gives an entry for 1935. We extended this index over 1936-9 by assuming its movements proportional to those of the Bureau of Labor Statistics index of average hourly earnings of production workers in manufacturing, taken here from *Statistical Abstract of the U.S. 1948*, p. 217, Table 232.

(b) *Method*. 'The index is a composite of all satisfactory data available.'

(c) *Kind of wage*. 1914-35, 'average wage-rates or earnings per hour for wage-earners actually at work'; 1936-9, hourly earnings.

(d) *Wage-earners*. 1914-35, 'the wage-earners of the country as a whole (exclusive of agricultural wage-earners)'; 1936-9, production workers in manufacturing only.

(e) *Weights*. Not stated.

B. Cost of Living

1860-80. Wesley C. Mitchell, *Gold, Prices and Wages under the Greenback Standard*, at p. 89, Table 28, taking median, and figures for eastern States, because it is from these that our wage data at this time are drawn. The prices are from *Report on the Average Retail Prices of Necessaries of Life in the U.S.*, prepared by J. D. Weeks, and published in the Tenth Census, vol. xx. The weights are based on the expenditure of 2,567 families collected after 1900 and recorded in the *18th Annual Report of the U.S. Commissioner of Labor*, 1903, with some supplementary estimates, yielding: food 316, fuel 42, lighting 5, clothing 31, rent 160, and sundries 3; and covering in all about 56 per cent. of family expenditure.

1881-9. Combination of indexes of cost of living and rents given in Carl Snyder, *Business Cycles and Business Measurements*. At p. 290, Table 23c gives an index of the cost of living, of which the following particulars are given at p. 137: '1875-1889, estimates of family budgets compiled by Russell Sage Foundation; 1890-1909, Cost of Living index estimated from retail food index of U.S. Dept of Labor.' At p. 291, Table 23d gives an index of rents, derived from a study of rents by the Russell Sage Foundation. We have combined these two indexes with weights, suggested by Wesley Mitchell's weighting (see under 1860-80), of 5 and 2.

1890-1914. P. H. Douglas, *Real Wages in the U.S. 1890-1926*, gives at p. 41,

Table 9, a 'most probable index of the movement of the total cost of living for working men', 1890-1914. The weights, derived from the family expenditure inquiry recorded in the *10th Annual Report of the U.S. Commissioner of Labor*, 1903, p. 569, and pp. 498-511, are: food 431, clothing 130, fuel and light 57, furniture and furnishings 34, liquor and tobacco 30, total 682. This we combined with the index of rents given by Carl Snyder (see under 1881-9), to which we assigned a weight of 180, since Douglas says that to include rent would bring the coverage of his index up from 68 to 86 per cent.

Continuous index, 1860-1914. We calculated the index described under 1881-9 for the longer period 1876-94; we spliced it to Douglas's index over 1890-4, and then spliced Mitchell's index to it over 1876-80.

1914-39. Statistical Abstract of the U.S. 1948, p. 302, Table 330, 'Consumers' Price Index for Moderate-Income Families in Large Cities', all items—food; clothing; rent; fuel, electricity, and ice; house furnishings; transportation, medical care; recreation, household operation, personal care. 'From 1913 to 1925, the weights used are based on a study of the family expenditures in 1917-19 of wage-earners and workers in large cities. From 1925 to 1935, the weights of the individual goods and services priced are based on the 1917-19 study, and the group indexes are based on the estimated distribution of family expenditures in the same period. From 1935, the weights are based on a study of family expenditures in 1934-6. The items priced since 1935 represent about 70 per cent. of the expenditure of families whose incomes averaged \$1,524.' (Ibid., p. 292.)

C. General Prices

1860-1914. Our indexes of cost of living and wage-rates combined with an index of wholesale prices, using weights 70, 15, and 15 respectively. The index of wholesale prices is from *Statistical Abstract of the U.S. 1948*, p. 302, Table 329, and p. 296, Table 324; all commodities—mostly raw materials and semis, and including farm products and foods.

1914-39. Our indexes of cost of living and wage-rates combined with the Dept. of Labor index of prices of manufactured products, using the weights 70, 10, and 20 respectively. The Dept. of Labor index is taken from the *Statistical Abstract of the U.S. 1933*, Table 308, and *1948*, Table 326. After 1928 it covered 582 products, and in later years it covers 655 products. The weights are the quantities marketed, for the earlier years in 1923-5, and, for the years since 1934, in 1929-31.

D. National Income per Occupied Person

1. National income, 1860-1939

From R. F. Martin, *National Income in the United States 1799-1939* (National Industrial Conference Board Studies, No. 241, 1939), at pp. 6-7, Table 1, col. 1: 'total realised national income'.

2. Occupied population

1860-1914. H. A. Millis and R. E. Montgomery, *Economics of Labour*, vol. i, *Labour's Progress and Problems*, gives at p. 28, table, col. 2, figures of the 'absolute number of persons ten years of age or over gainfully occupied each census year since 1870'. We made a corresponding estimate for 1860, by applying to the total population aged 10 and more in that year (taken from Census of U.S. for 1870) the ratio 42 per cent., which was obtained by carrying back to 1860 the course of change through later decades of the proportion of the gainfully occupied to all persons 10 years old and over. We made estimates for intercensal years by linear interpolation.

1914-39. We assumed that changes in occupied population were proportional to

those in total population aged 15-59 inclusive, which were taken from *Statistical Abstract of the U.S. 1948*, p. 25, Table 24; intercensal years by linear interpolation.

E. Long-term Rate of Interest

1860-1913. F. R. Macaulay, *Bond Yields, Interest Rates and Stock Prices* (National Bureau of Economic Research), Appendix Table 13, p. A. 174, 'New England Municipal Bond Yields. Arithmetic Average. Quarterly Index Number'. Quarterly entries averaged to yield annual figure.

1919-39. *Banking and Monetary Statistics* (Board of Governors of the Federal Reserve System, 1943), p. 468, Yield of U.S. Govt. Bonds, issues 2-6.

TABLE I. *Indexes (1890-9 = 100) of Money Wage-rates and of Other Variables, with Long-term Rate of Interest, in France, Germany, Sweden, United Kingdom, and United States of America. 1860-1913,14*

A. FRANCE

Year (1)	Money wage-rate (2)	Wage- earn-er's cost of living (3)	Wage-rate in consump- tion units (2-3) (4)	Price-level of final products (5)	Wage-rate in product units (2-5) (6)	National Income (in money) per occupied person (7)* (7)	Wage- income ratio (2-7) (8)	National Income (in product units) per occupied person (7-5) (9)	Long-term rate of interest (%) (10)
1860	64	97	66	108	60	68	94	63	4.33
61	65	103	63	109	60	..	..	..	4.38
62	66	99	67	109	61	..	..	..	4.28
63	68	97	70	109	62	..	..	..	4.39
64	68	93	74	106	64	..	..	..	4.54
65	69	92	75	103	67	..	..	..	4.42
66	70	96	73	105	67	..	..	..	4.51
67	71	104	69	108	66	..	..	..	4.41
68	73	106	69	109	67	..	..	..	4.28
69	74	98	76	104	71	..	..	..	4.18
1870	75	101	75	107	70	..	..	..	4.77
71	76	120	63	119	64	..	..	..	5.51
72	77	110	70	116	66	..	..	..	5.47
73	78	114	68	119	66	..	..	..	5.34
74	78	117	67	117	67	..	..	..	4.89
75	80	102	79	108	75	..	..	..	4.67
76	81	106	77	110	74	..	..	..	4.35
77	84	110	76	112	75	..	..	..	4.27
78	85	110	78	110	78	..	..	..	4.06
79	86	104	83	105	82	..	..	..	3.70
1880	89	110	81	110	81	98	91	89	3.56
81	90	..	..	..	..	..	..	..	3.54
82	92	108	86	108	85	..	..	..	3.67
83	93	110	85	109	85	..	..	..	3.83
84	93	105	89	105	89	..	..	..	3.88
85	93	101	93	101	92	..	..	..	3.78
86	94	99	95	100	95	..	..	..	3.66
87	95	97	98	98	97	..	..	..	3.78
88	95	100	95	101	94	..	..	..	3.62
89	96	100	96	102	94	..	..	..	3.51
1890	97	101	96	103	94	95	103	92	3.26
91	99	103	95	104	95	..	..	..	3.18
92	99	103	96	102	97	..	..	..	3.07
93	99	100	98	100	99	..	..	..	3.11
94	99	101	98	99	100	..	..	..	2.98
95	99	99	100	98	101	..	..	..	2.95
96	100	97	104	96	104	..	..	..	2.94
97	101	97	105	97	105	..	..	..	2.91
98	103	99	103	99	104	..	..	..	2.92
99	105	100	105	103	102	..	..	..	2.97
1900	105	97	108	104	102	106	100	102	2.98
01	106	97	109	102	104	..	..	..	2.97
02	105	92	115	98	108	..	..	..	2.99
03	106	94	114	100	106	..	..	..	3.05
04	107	94	114	100	107	..	..	..	3.11
05	108	92	117	100	108	..	..	..	3.03
06	112	92	122	103	109	..	..	..	3.08
07	113	95	119	106	107	..	..	..	3.16
08	113	96	118	104	110	..	..	..	3.13
09	114	96	119	104	110	..	..	..	3.07
1910	115	100	114	109	106	134	85	123	3.07
11	116	109	106	115	101	3.14
12	117	114	103	119	98	3.26
13	119	112	106	118	101	3.44
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* Base = mean of 1890 and 1900.

B. GERMANY

Year (1)	Money wage-rate (2)	Wage- earner's cost of living (3)	Wage-rate in consump- tion units (2-3) (4)	Price-level of final products (5)	Wage-rate in product units (2-5) (6)	National Income (in money) per occupied person (7)	Wage- income ratio (2÷7) (8)	National Income (in product units) per occupied person (7-5) (9)	Long-term rate of interest (%) (10)
1860	60	83	72	88	67	..	..	..	..
61	61	88	70	91	67	..	..	..	..
62	61	88	70	91	67	..	..	..	..
63	61	80	77	87	71	..	..	..	..
64	62	74	84	85	73	..	..	..	..
65	62	77	81	85	73	..	..	..	..
66	64	84	77	89	72	..	..	..	..
67	65	100	65	99	65	..	..	..	..
68	66	101	66	99	67	..	..	..	..
69	69	91	76	93	74	..	..	..	..
1870	72	93	77	96	75	..	..	..	4.61
71	73	100	73	102	71	..	..	..	4.44
72	81	104	79	112	73	75	108	67	4.26
73	90	113	80	121	75	77	118	64	4.30
74	94	117	81	120	79	79	119	66	4.24
75	94	104	91	108	87	79	119	73	4.25
76	90	107	84	107	84	81	111	76	4.22
77	84	109	78	105	80	81	105	77	4.23
78	84	102	82	99	84	81	104	82	4.25
79	81	99	82	96	85	80	102	83	4.18
1880	82	106	77	101	81	79	103	78	4.05
81	83	107	78	101	82	79	105	78	3.97
82	85	104	82	100	86	80	107	80	3.95
83	86	103	84	99	87	..	..	..	3.93
84	87	97	90	95	92	..	..	..	3.88
85	88	94	94	93	94	81	108	87	3.81
86	88	91	97	90	98	..	..	..	3.73
87	90	91	99	91	98	..	..	..	3.70
88	92	92	101	93	99	84	110	90	3.64
89	95	98	97	98	96	..	..	..	3.61
1890	98	102	97	103	96	87	113	84	3.67
91	98	104	94	103	95	90	109	87	3.71
92	97	102	95	101	97	92	106	91	3.67
93	97	97	100	97	100	95	102	98	3.66
94	96	98	98	97	100	98	99	101	3.55
95	98	97	101	97	101	100	98	103	3.37
96	100	97	103	97	103	105	96	108	3.34
97	102	99	102	100	102	109	93	109	3.36
98	105	101	103	102	103	111	94	109	3.41
99	109	101	107	105	103	113	96	108	3.54
1900	111	102	109	109	102	115	97	106	3.68
01	111	103	107	107	104	115	97	107	3.65
02	111	105	105	107	104	114	97	107	3.52
03	112	104	107	108	104	115	98	106	3.53
04	115	108	107	110	104	117	99	106	3.57
05	118	112	108	114	104	119	100	104	3.57
06	124	114	109	118	105	125	99	106	3.63
07	129	118	109	123	105	129	100	103	3.75
08	128	120	107	121	106	130	99	107	3.80
09	129	124	104	124	105	133	97	107	3.70
1910	133	124	107	125	106	135	99	108	3.76
11	136	127	107	128	107	138	99	108	3.79
12	140	134	103	134	104	141	100	105	3.91
13	145	132	110	..	..	145	100	..	4.09
14	148	..	112	..	..	..	..	..	..

C. SWEDEN

Year (1)	Money wage-rate (2)	Wage- earner's cost of living (3)	Wage-rate in consump- tion units (2 ÷ 3) (4)	Price-level of final products (5)	Wage-rate in product units (2 ÷ 5) (6)	National Income (in money) per occupied person (7)	Wage- income ratio (3 ÷ 7) (8)	National Income (in product units) per occupied person (7 ÷ 5) (9)	Long-term rate of interest (%) (10)
1860	..	..	..	..	..	..	..	..	..
61	50	106	47	101	50	55	92	54	..
62	55	109	50	103	53	58	95	56	..
63	55	103	53	99	56	55	100	56	..
64	52	99	53	96	54	55	95	57	..
65	56	99	57	96	58	54	104	56	..
66	54	102	53	98	55	57	95	58	..
67	56	108	52	101	55	57	98	56	..
68	60	112	54	104	58	55	109	53	..
69	63	105	60	100	63	58	109	58	..
1870	60	101	59	96	63	63	95	66	..
71	62	104	60	99	63	68	91	69	..
72	70	108	65	109	64	74	95	68	..
73	74	116	64	118	63	86	86	73	..
74	81	121	67	120	68	85	95	71	..
75	82	120	68	117	70	86	95	74	..
76	79	120	66	115	69	86	92	75	..
77	82	119	69	114	72	84	98	74	..
78	78	112	70	106	74	76	103	72	..
79	72	105	69	100	72	73	99	73	..
1880	76	110	69	106	72	81	94	76	..
81	80	113	71	107	75	78	103	73	..
82	83	110	75	106	78	82	101	77	..
83	83	109	76	105	81	83	100	79	..
84	84	105	80	102	82	82	102	80	..
85	83	100	83	98	85	78	106	80	..
86	81	95	85	93	87	75	108	81	..
87	81	92	88	91	89	71	114	78	3-75
88	83	95	87	94	88	80	104	85	3-64
89	88	100	88	99	89	84	105	85	3-59
1890	90	102	88	101	89	89	101	88	3-58
91	92	105	88	103	89	95	97	92	3-69
92	93	103	90	101	92	93	100	92	3-85
93	95	99	96	98	97	92	103	94	3-78
94	96	94	102	94	102	91	105	97	3-68
95	97	96	101	96	101	96	101	100	3-63
96	101	95	106	96	105	102	99	106	3-61
97	106	98	108	99	107	107	99	108	3-50
98	112	103	109	104	108	116	97	112	3-50
99	117	107	109	110	106	119	98	108	3-60
1900	122	108	113	114	107	126	97	111	..
01	122	106	115	110	111	118	103	107	..
02	125	106	118	110	114	122	102	111	3-60
03	126	108	117	112	113	131	96	117	3-60
04	130	107	121	112	116	127	102	113	3-60
05	134	109	123	114	118	134	100	118	3-60
06	142	112	127	118	120	150	95	127	3-60
07	150	117	128	124	121	162	93	131	..
08	153	119	129	125	122	164	93	131	..
09	157	118	133	125	126	160	98	128	3-80
1910	165	118	140	127	130	171	96	135	3-80
11	167	116	144	125	134	172	97	138	3-87
12	173	124	140	133	130	185	94	139	4-21
13	177	124	143	135	131	193	92	143	4-42
14	..	..	..	..	..	..	..	..	..

D. UNITED KINGDOM

Year (1)	Money wage-rate (2)	Wage- earner's cost of living (3)	Wage-rate in consump- tion units (2-3) (4)	Price-level of final products (5)	Wage-rate in product units (2-5) (6)	National Income (in money) per occupied person (7)	Wage- income ratio (2-7) (8)	National Income (in product units) per occupied person (3-5) (9)	Long-term rate of interest (%) (10)
1860	68	130	52	123	55	.	..	.	3.19
61	68	129	53	122	56	.	..	..	3.28
62	68	130	52	126	54	68	101	54	3.23
63	70	133	53	133	53	.	..	..	3.24
64	73	133	55	136	54	.	..	..	3.33
65	75	130	58	133	56	..	..	.	3.35
66	78	131	60	134	58	.	..	..	3.41
67	77	131	59	131	59	75	103	57	3.23
68	75	130	58	128	59	..	..	..	3.20
69	75	128	59	127	59	..	..	..	3.23
1870	78	127	61	125	62	82	95	66	3.24
71	80	130	62	128	63	86	93	67	3.23
72	89	138	64	137	65	90	99	66	3.24
73	96	141	68	140	69	97	99	69	3.24
74	100	133	75	133	75	96	104	72	3.24
75	100	128	78	128	78	89	112	70	3.20
76	99	127	78	125	79	90	110	72	3.16
77	98	127	77	124	79	90	109	73	3.15
78	95	120	79	118	81	87	109	74	3.15
79	93	116	80	114	82	82	113	72	3.08
1880	93	121	77	118	79	86	108	73	3.05
81	93	119	78	115	81	88	106	77	3.00
82	93	118	79	115	81	90	103	78	2.98
83	94	118	80	115	82	92	102	80	2.97
84	94	112	84	110	85	87	108	79	2.97
85	93	105	89	104	89	85	109	82	3.02
86	93	103	90	101	92	85	109	84	2.98
87	93	101	92	100	93	86	108	86	2.95
88	93	101	92	100	93	92	101	92	3.02
89	96	103	93	102	94	97	99	95	2.87
1890	100	103	97	104	96	101	99	97	2.85
91	100	103	97	104	96	99	101	95	2.87
92	100	104	96	104	96	96	104	92	2.85
93	99	103	96	102	97	93	106	91	2.79
94	99	98	101	98	101	95	104	97	2.72
95	98	96	102	96	102	99	99	103	2.59
96	99	96	103	97	102	100	99	103	2.48
97	100	98	102	98	102	102	98	104	2.45
98	102	101	101	100	102	106	96	106	2.48
99	104	99	105	100	104	110	95	110	2.58
1900	108	105	103	107	101	114	95	107	2.76
01	107	104	103	106	101	111	96	105	2.92
02	107	104	103	105	102	111	97	106	2.91
03	106	105	101	106	100	108	98	102	2.83
04	105	106	99	107	96	109	96	102	2.83
05	105	106	99	107	98	112	94	105	2.78
06	107	107	100	109	97	118	90	108	2.83
07	107	110	97	112	95	123	87	110	2.97
08	107	107	100	110	96	115	93	105	2.90
09	107	108	98	110	96	117	92	106	2.97
1910	107	110	97	112	95	121	89	108	3.08
11	108	112	96	114	94	124	87	109	3.15
12	111	115	97	117	94	130	85	111	3.28
13	115	118	97	120	93	135	85	113	3.40
14	115	115*	100	118	96	128	90	108	3.34

First $\frac{1}{2}$ year.

E. UNITED STATES OF AMERICA

Year (1)	Money wage-rate (2)	Wage- earner's cost of living (3)	Wage-rate in consump- tion units (2-3) (4)	Price-level of final products (5)	Wage-rate in product units (2-5) (6)	National Income (in money) per occupied person (7)	Wage- income ratio (2-7) (8)	National Income (in product units) per occupied person (7-5) (9)	Long-term rate of interest (%) (10)
1859	..	..	..	..	..	94	61	116*	..
1860	57	78	73	81	70	..	..	..	4.79
61	61	81	75	84	73	..	..	..	5.04
62	64	87	74	92	70	..	..	..	4.92
63	70	100	70	107	65	..	..	..	4.37
64	80	117	68	128	63	..	..	..	4.83
65	90	127	71	141	64	..	..	..	5.54
66	95	135	70	143	66	..	..	..	5.52
67	101	132	77	138	73	..	..	..	5.34
68	102	129	79	135	76	..	..	..	5.29
69	103	127	83	132	80	111	95	84	5.38
1870	104	126	83	129	81	..	..	..	5.44
71	103	119	87	123	84	..	..	..	5.33
72	103	115	90	121	85	..	..	..	5.37
73	103	115	90	121	85	..	..	..	5.55
74	101	111	91	117	86	..	..	..	5.49
75	97	110	88	115	84	..	..	..	5.07
76	91	108	84	110	83	..	..	..	4.59
77	85	105	81	106	80	..	..	..	4.45
78	83	109	83	101	82	..	..	..	4.34
79	83	97	86	98	85	85	98	87	4.22
1880	86	100	86	102	84	..	..	..	4.02
81	92	101	91	103	89	..	..	..	3.72
82	94	103	91	106	89	..	..	..	3.63
83	96	100	96	104	92	..	..	..	3.63
84	96	96	100	99	97	..	..	..	3.63
85	97	94	103	97	100	..	..	..	3.53
86	97	94	103	97	100	..	..	..	3.39
87	97	94	103	97	100	..	..	..	3.53
88	98	97	101	99	99	..	..	..	3.67
89	99	99	100	101	98	93	106	92	3.46
1890	99	103	96	103	96	..	..	..	3.42
91	100	101	99	102	98	..	..	..	3.64
92	100	101	99	101	99	..	..	..	3.61
93	101	100	101	101	100	..	..	..	3.74
94	99	97	102	97	102	..	..	..	3.69
95	98	98	100	98	100	..	..	..	3.46
96	100	99	101	98	102	..	..	..	3.61
97	99	100	99	99	100	..	..	..	3.39
98	100	100	100	99	101	..	..	..	3.35
99	103	102	101	102	101	107	96	105	3.11
1900	107	105	102	106	101	110	97	104	3.15
01	110	107	103	108	102	113	97	105	3.12
02	114	110	104	112	102	118	97	105	3.22
03	119	114	104	115	103	122	98	106	3.38
04	120	113	106	115	104	122	98	106	3.45
05	122	114	107	116	105	126	97	109	3.44
06	127	117	109	119	107	133	95	112	3.62
07	131	123	107	125	105	136	96	109	3.90
08	130	119	109	121	107	128	102	106	4.03
09	132	119	111	123	107	141	94	115	3.86
1910	135	125	108	128	105	146	92	114	4.00
11	137	128	107	129	106	145	94	112	4.01
12	141	129	109	132	107	150	94	114	4.07
13	146	133	110	136	107	159	92	117	4.40
14	148	135	110	137	108	156	95	114	..

* National income for 1859 and price level of final products for 1880.

TABLE II. *Indexes (1925-9 = 100) of Money Wage-rates and of Other Variables, with Long-term Rate of Interest, in France, Germany, Sweden, United Kingdom, and United States of America. 1913/14-1938/9*

A. FRANCE

Year (1)	Money wage-rate (2)	Wage- earner's cost of living (3)	Wage-rate in consump- tion units (2 ÷ 3) (4)	Price-level of final products* (5)	Wage-rate in product units (2 ÷ 5) (6)	National Income (in money) per occupied person (7)	Wage- income ratio (2 ÷ 7) (8)	National Income (in product units) per occupied person (7 ÷ 5) (9)	Long-term rate of interest (%) (10)
	(1911) 15	(1914) 18							
1913	..	..	81	17	88	17	84	100	3.44
1920	..	70	..	..	..	51	..	..	..
1921	69	68	101	..	..	54	129	..	5.30
22	..	58	..	..	..	56	..	..	5.04
23	..	64	..	..	..	63	..	..	5.45
24	77	74	104	..	..	73	106	..	5.61
25	83	82	102	..	..	81	103	..	6.36
26	97	104	93	104	93	98	99	94	5.96
27	100	104	96	101	99	99	101	98	5.29
28	104	102	102	101	102	107	97	106	4.34
29	116	108	107	107	108	115	101	107	3.97
1930	123	109	114	106	116	114	108	108	3.43
31	123	107	115	102	121	107	115	105	3.58
32	120	95	126	92	131	98	123	107	3.80
33	118	90	131	88	134	95	123	108	4.20
34	118	85	139	85	139	87	136	102	4.19
35	115	75	153	78	148	86	134	110	3.84
36	133	81	164	87	154	100	133	115	4.09
37	174	103	170	113	154	122	142	108	4.41
38	190	118	161	127	149	137†	139†	108†	3.87
39	194	128	152	137	142	..	..	..	..

* For the wholesale price component 1926/9 = 100.

† National income for 1938 is a provisional estimate.

B. GERMANY

<i>Year</i> (1)	<i>Money wage-rate</i> (2)	<i>Wage- earner's cost of living</i> (3)	<i>Wage-rate in consump- tion units (2-3)</i> (4)	<i>Price-level of final products</i> (5)	<i>Wage-rate in product units (2-5)</i> (6)	<i>National Income (in money) per occupied person</i> (7)	<i>Wage- income ratio (2-7)</i> (8)	<i>National Income (in product units) per occupied person (7-5)</i> (9)	<i>Long-term rate of interest (%)</i> (10)
1913	65	(1913/14) 68	95	68	94	78	83	115	4.09
1925	87	96	90	96	90	88	99	92	8.24
26	94	96	98	96	98	91	103	95	6.87
27	99	100	99	100	99	103	97	103	6.30
28	107	103	104	103	104	109	98	106	6.98
29	113	104	108	105	108	109	104	104	7.40
1930	115	100	114	100	115	100	114	100	7.15
31	109	92	118	92	119	82	133	89	7.04
32	92	82	113	80	115	64	144	80	8.38
33	90	80	112	79	114	66	137	84	7.15
34	90	82	109	80	112	74	121	93	6.57
35	90	83	108	81	110	82	110	101	5.08
36	90	84	106	83	109	90	99	108	4.67
37	90	85	106	83	108	98	91	118	4.54
38	..	85	..	..	..	..	..	..	..

C. SWEDEN

Year (1)	Monthly wage-rate (2)	Wage- earner's cost of living (3)	Wage-rate in consump- tion units (2-3) (4)	Price-level of final products (5)	Wage-rate in product units (2-5) (6)	National Income (in money) per occupied person (7)	Wage- income ratio (2-7) (8)	National Income (in product units) per occupied person (7-5) (9)	Long-term rate of interest (%) (10)
1914	38	38	65	58*	65	54	70	93	4.66
15	42	67	63	..	..	61	69	..	5.31
16	46	81	57	..	..	75	61	..	5.09
17	57	94	60	..	..	90	63	..	5.65
18	82	131	63	..	..	114	72	..	5.76
19	107	152	71	..	..	132	81	..	5.71
1920	142	157	91	172	82	155	91	90	7.00
21	136	140	97	142	96	106	123	75	5.48
22	97	114	85	112	86	93	104	83	4.82
23	93	103	90	103	90	93	100	90	4.86
24	94	101	93	102	92	94	100	92	4.90
25	98	102	95	103	95	97	101	94	4.83
26	100	100	99	100	100	98	102	98	4.68
27	100	100	100	99	101	99	101	100	4.68
28	100	100	101	100	101	100	100	100	4.59
29	103	98	105	98	105	107	96	109	4.56
1930	104	96	109	94	111	103	101	110	4.18
31	104	93	112	90	115	93	111	103	4.22
32	100	91	110	88	114	84	119	95	4.32
33	99	89	111	87	114	84	118	97	4.02
34	99	90	111	88	113	94	106	107	3.47
35	101	91	111	89	113	99	102	111	3.19
36	103	92	111	91	113	108	95	119	3.12
37	106	94	113	95	112	121	88	127	3.04
38	112	97	116	96	117	126	89	131	2.88
39	116	100	116	..	..	135	86	..	3.14

* Wholesale price figure for 1913.

D. UNITED KINGDOM

Year (1)	Money wage-rate (2)	Wage- earner's cost of living (3)	Wage-rate in consump- tion units (2-3) (4)	Price-level of final products (5)	Wage-rate in product units (2-5) (6)	National Income (in money) per occupied person (7)	Wage- income ratio (2-7) (8)	National Income (in product units) per occupied person (7-5) (9)	Long-term rate of interest (%) (10)
1914	51	59	87	58	89	62	83	107	3.34
15	55	74	75	69	80	..	..	..	3.82
16	60	85	71	81	75	..	..	..	4.31
17	71	106	67	101	70	..	..	..	4.57
18	91	121	76	121	75	..	..	..	4.40
19	119	131	90	138	86	..	..	..	4.63
1920	159	159	100	170	93	155	103	91	5.32
21	127	118	108	129	98	121	105	94	5.21
22	99	107	93	110	90	104	95	95	4.43
23	98	105	93	106	93	102	96	96	4.31
24	100	107	93	107	93	99	101	93	4.39
25	100	104	97	105	96	99	101	94	4.43
26	101	103	98	103	98	97	104	94	4.55
27	101	98	103	98	103	102	99	104	4.56
28	99	98	101	98	102	101	98	103	4.48
29	99	97	102	97	102	101	98	104	4.60
1930	98	93	105	93	105	95	103	102	4.48
31	97	86	113	86	113	87	111	101	4.39
32	95	84	112	83	114	84	113	101	3.75
33	94	83	113	82	114	88	107	107	3.40
34	94	83	113	82	114	91	103	111	3.10
35	96	86	112	85	113	95	100	112	2.89
36	98	88	112	87	113	101	97	116	2.94
37	102	93	110	92	111	105	97	114	3.28
38	104	92	114	92	113	106	99	115	3.38
39	106	94	113	..	..	..	..	..	3.72

E. UNITED STATES OF AMERICA

Year (1)	Money wage-rate (2)	Wage- earner's cost of living (3)	Wage-rate in consump- tion units (2-3) (4)	Price-level of final products (5)	Wage-rate in product units (2-5) (6)	National Income (in money) per occupied person (7)	Wage- income ratio (2-7) (8)	National Income (in product units) per occupied person (7-5) (9)	Long-term rate of interest (%) (10)
1914	44	58	77	59	75	51	86	86	..
15	45	58	77	59	76	53	85	90	..
16	48	63	77	66	73	62	78	94	..
17	56	74	75	80	70	73	76	91	..
18	70	87	81	94	74	89	79	95	..
19	80	100	80	105	76	97	83	92	4.73
1920	102	115	88	122	84	104	98	85	5.32
21	95	103	92	103	92	85	112	83	5.09
22	90	96	94	96	94	84	108	88	4.30
23	94	98	96	98	96	94	100	96	4.36
24	97	98	99	98	99	95	102	97	4.06
25	98	101	97	101	97	97	101	96	3.86
26	100	102	98	102	98	100	99	98	3.68
27	100	100	101	100	100	99	101	99	3.34
28	101	99	102	99	102	100	101	101	3.33
29	101	99	103	99	102	103	98	104	3.60
1930	100	96	103	95	105	92	108	97	3.29
31	94	88	108	87	108	76	124	87	3.34
32	81	79	103	78	104	58	139	74	3.68
33	77	74	104	74	104	55	140	74	3.31
34	88	77	114	79	111	63	139	80	3.12
35	90	79	114	81	111	68	132	84	2.79
36	91	80	114	82	111	78	116	95	2.65
37	102	83	123	86	119	82	124	95	2.68
38	103	81	127	84	123	73	142	87	2.56
39	105	80	131	83	127	..	..	..	2.36

LIST OF GRAPHS

SECTION 1

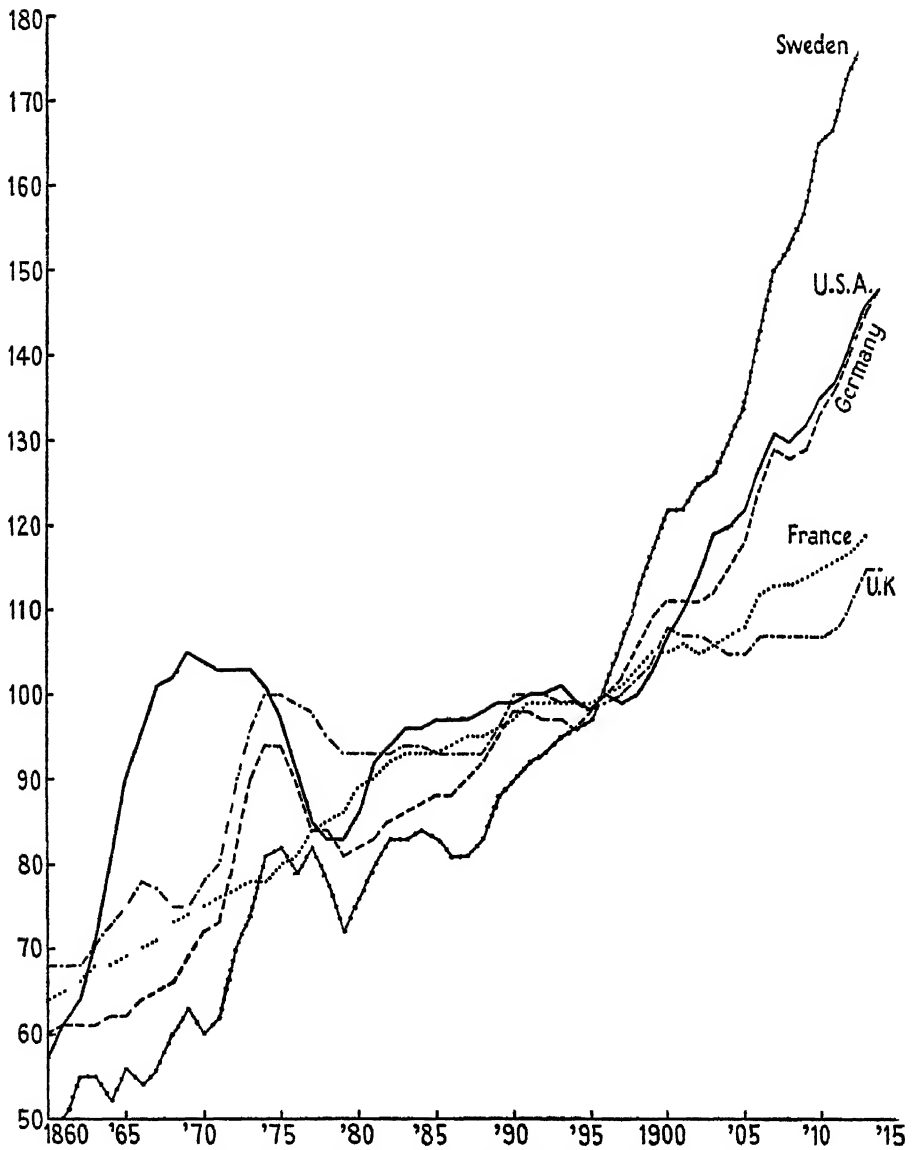
1860-1913/14

1. Money wage-rates.
2. Wage-earner's cost of living.
- 3*a*. Wage-rate in consumption units, and 3*b* smoothed series of wage-rate in consumption units.
4. Price-level of final products.
- 5*a*. Wage-rate in product units, and 5*b* smoothed series of wage-rate in product units.
6. National Income (in money) per occupied person.
7. Wage-income ratio.
8. National Income (in product units) per occupied person.
9. Long-term rate of interest.

SECTION 2

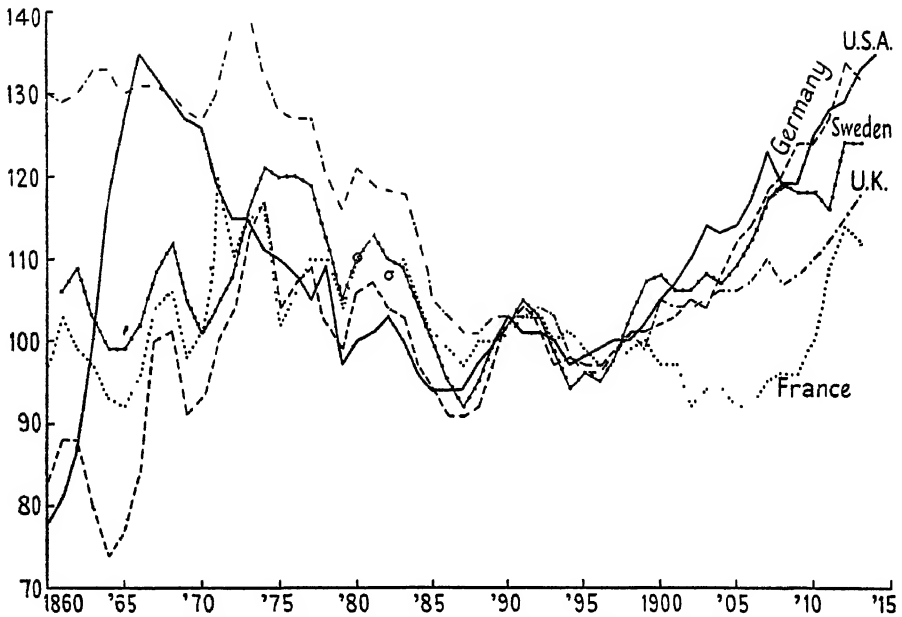
1913/14-1938/9

10. Money wage-rates.
11. Wage-earner's cost of living.
12. Wage-rate in consumption units.
13. Price-level of final products.
14. Wage-rate in product units.
15. National Income (in money) per occupied person.
16. Wage-income ratio.
17. National Income (in product units) per occupied person.
18. Long-term rate of interest.



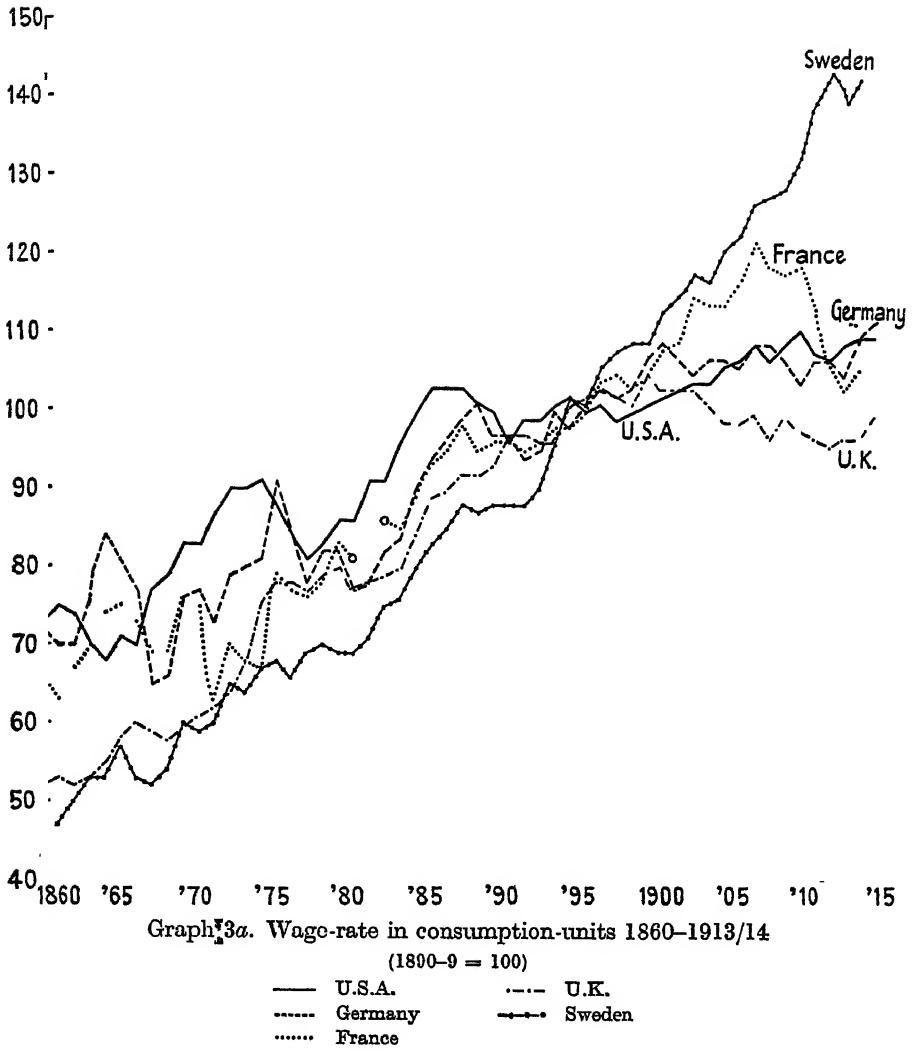
GRAPH 1. Money Wage-rates 1860-1913/14
(1890-9 = 100)

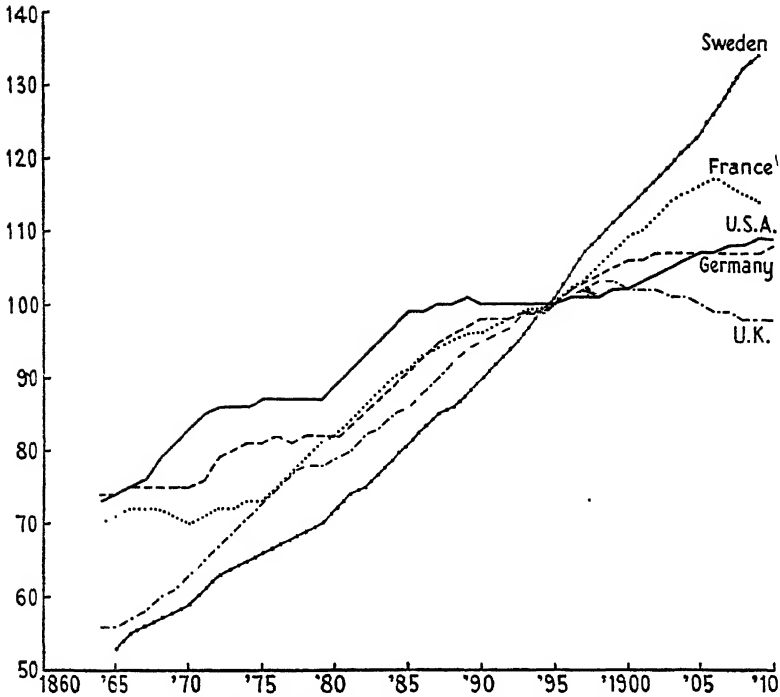
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- - - Germany	—•— Sweden
..... France	



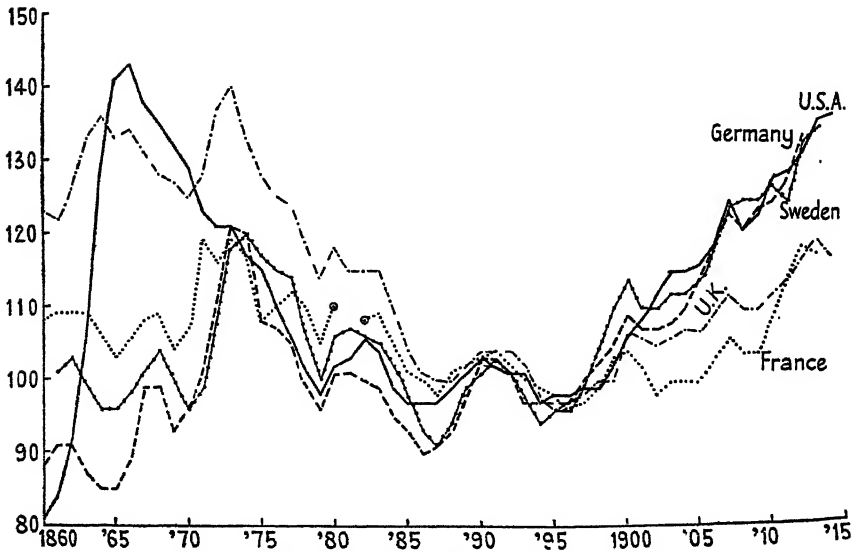
Graph 2. Wage-earner's cost of living 1860-1913/14
(1890-9 = 100)

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- - - Germany	- . - Sweden
..... France	

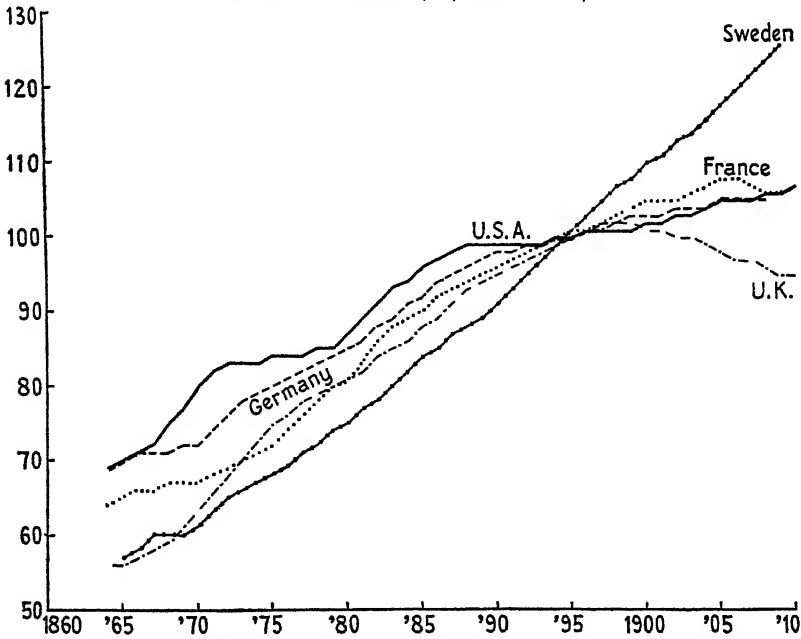
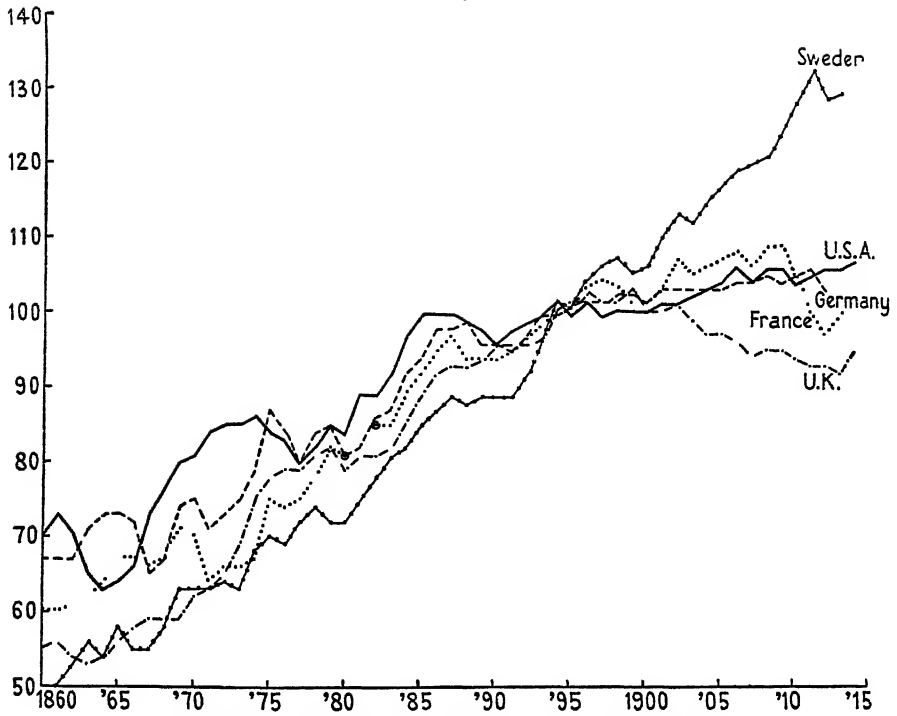


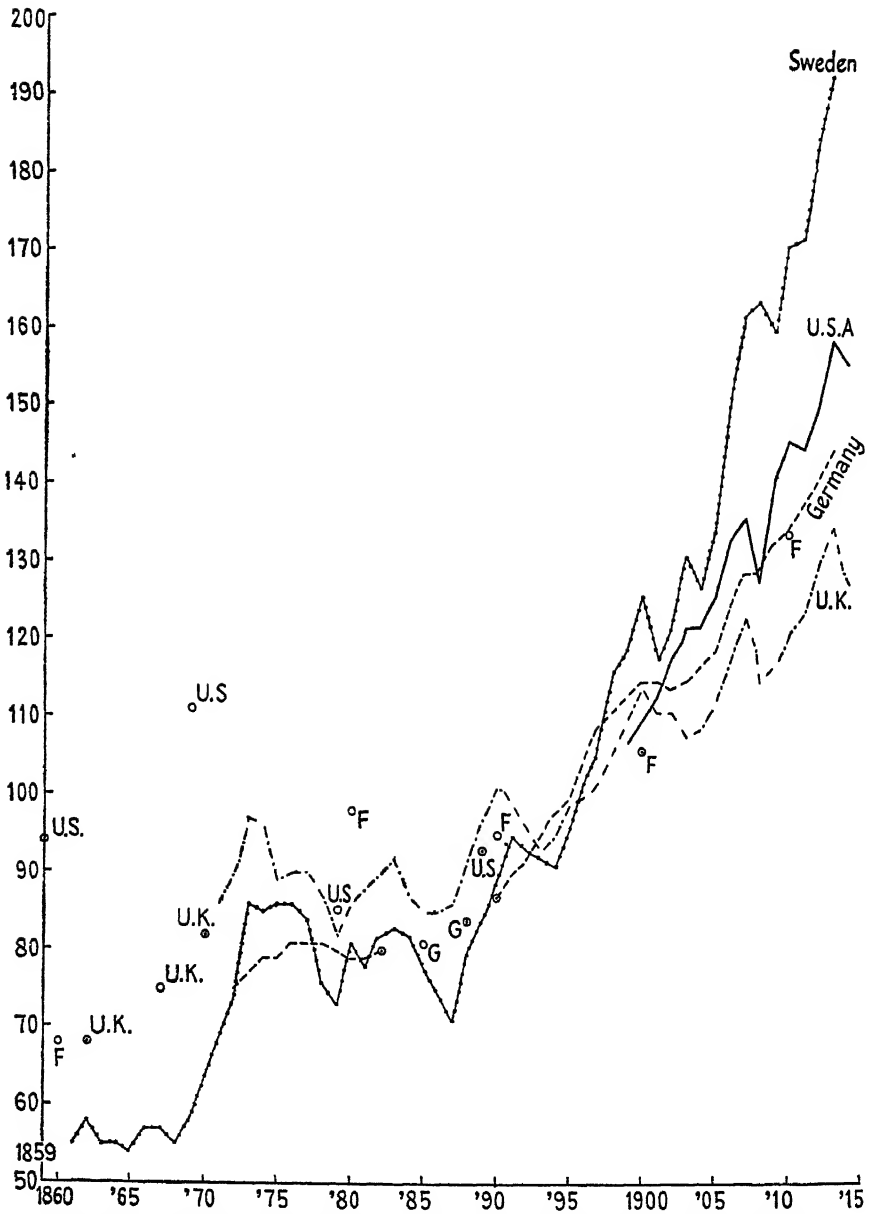


Graph 3b. Wage-rate in consumption units
(9 years moving average smoothed series 1860-1914)
(1890-9 = 100)

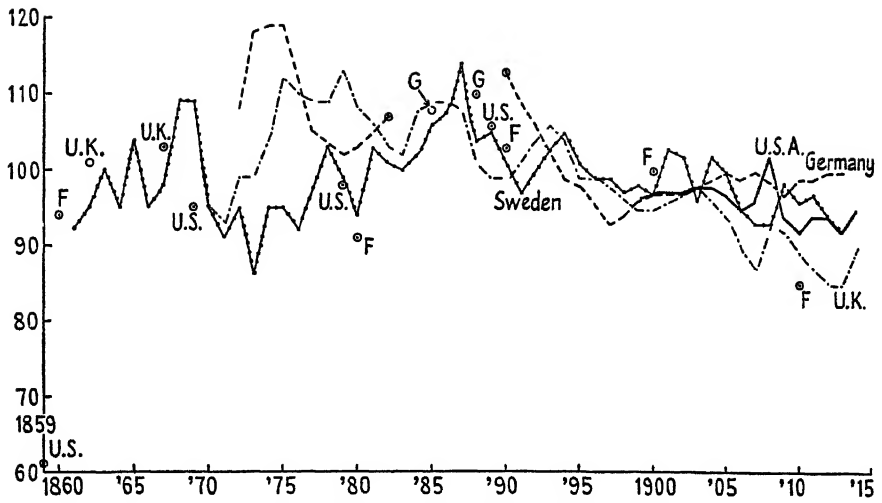


Graph 4. Price-level of final products 1860-1913/14
(1890-9 = 100)

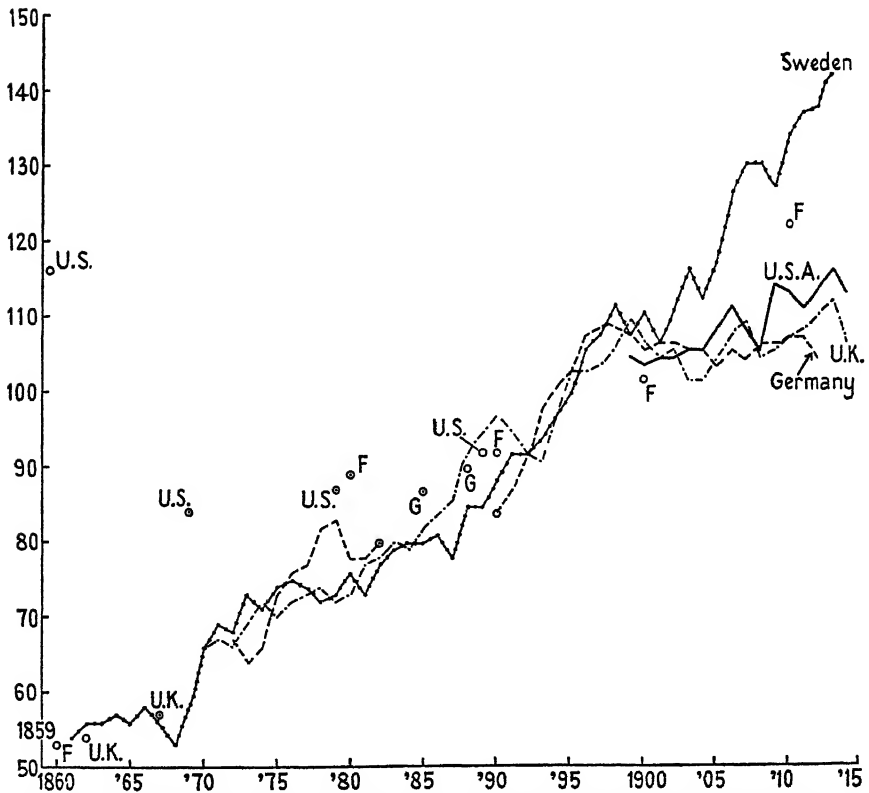




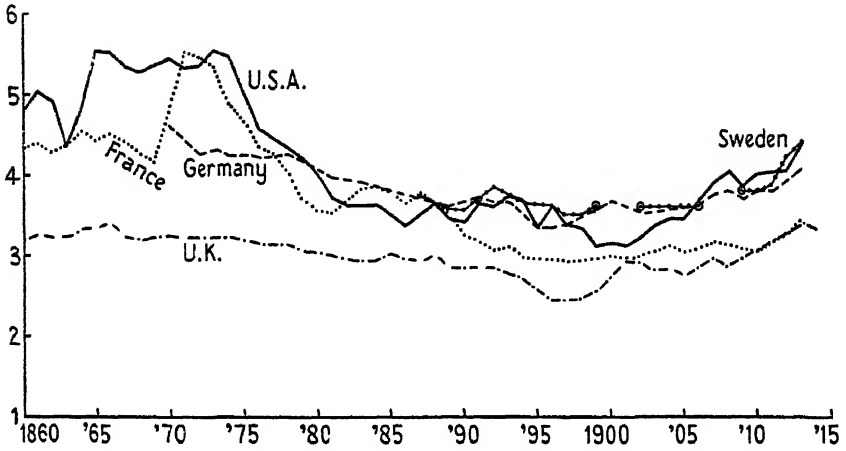
Graph 6. National Income (in money) per occupied person 1860-1913/14
(1890-9 = 100)



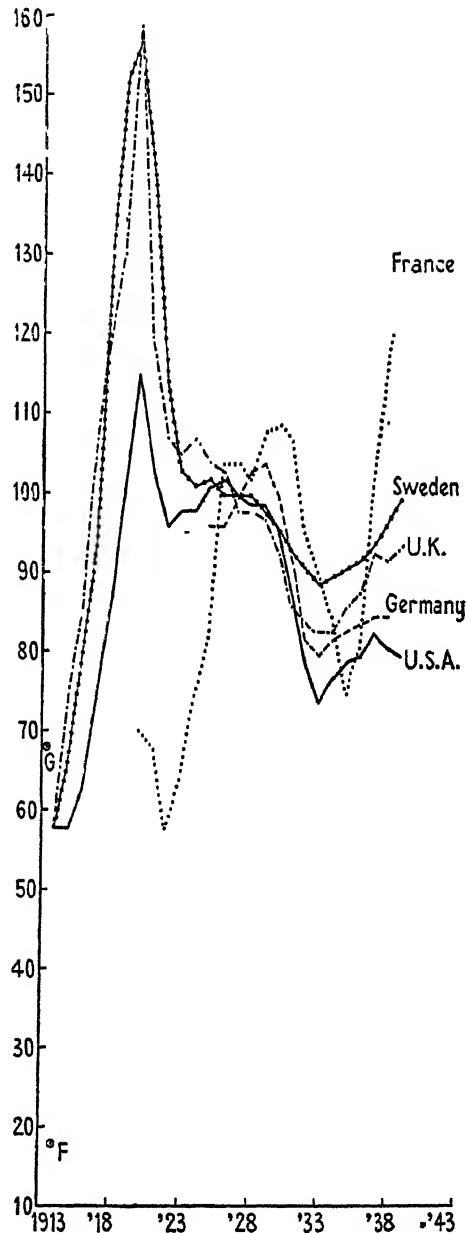
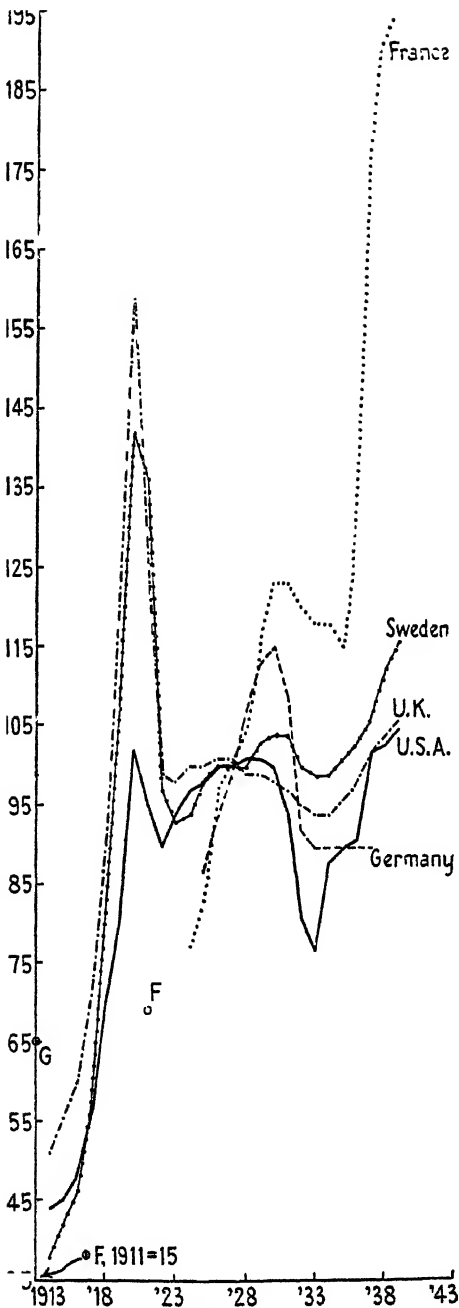
Graph 7. Wage-income ratio, 1860-1913/14
(cols. 2 ÷ 7 of Table I) (1890-9 = 100)

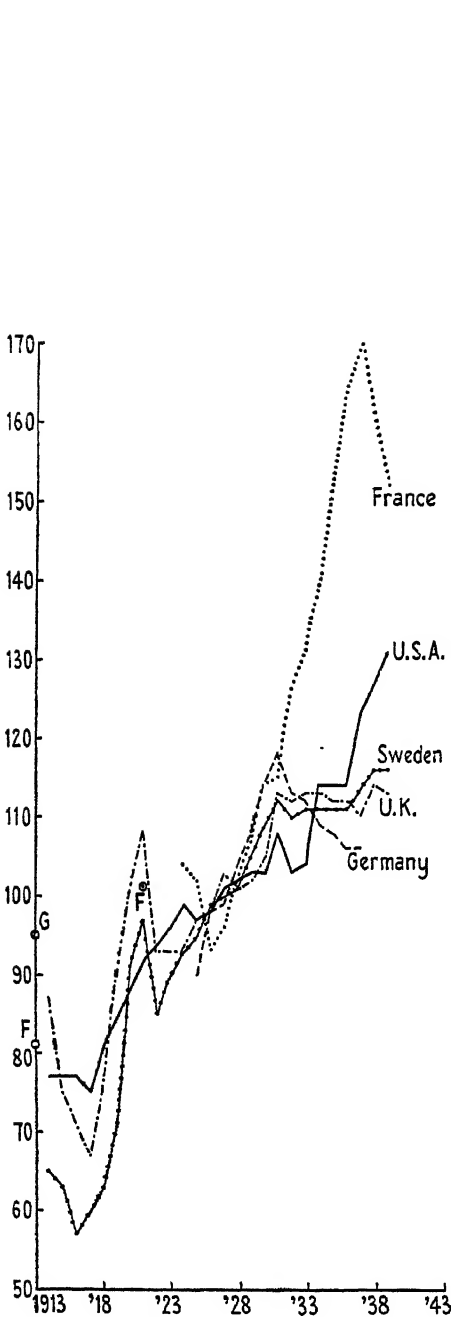


Graph 8. National Income (in product units) per occupied person 1860-1913/14
(1890-9 = 100)

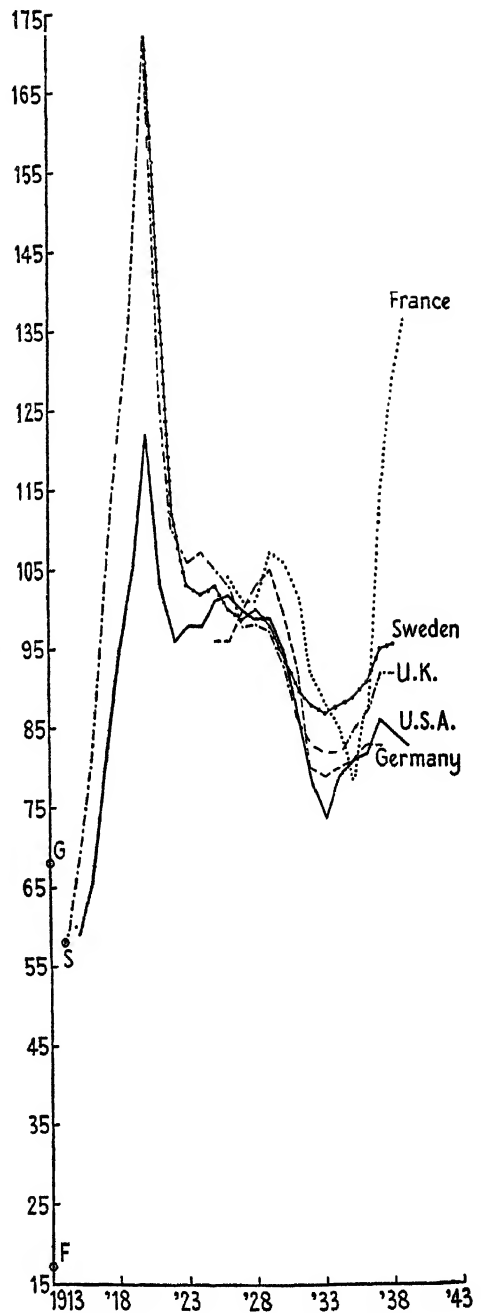


Graph 9. Long-term rate of interest (percentages) 1860-1913/14

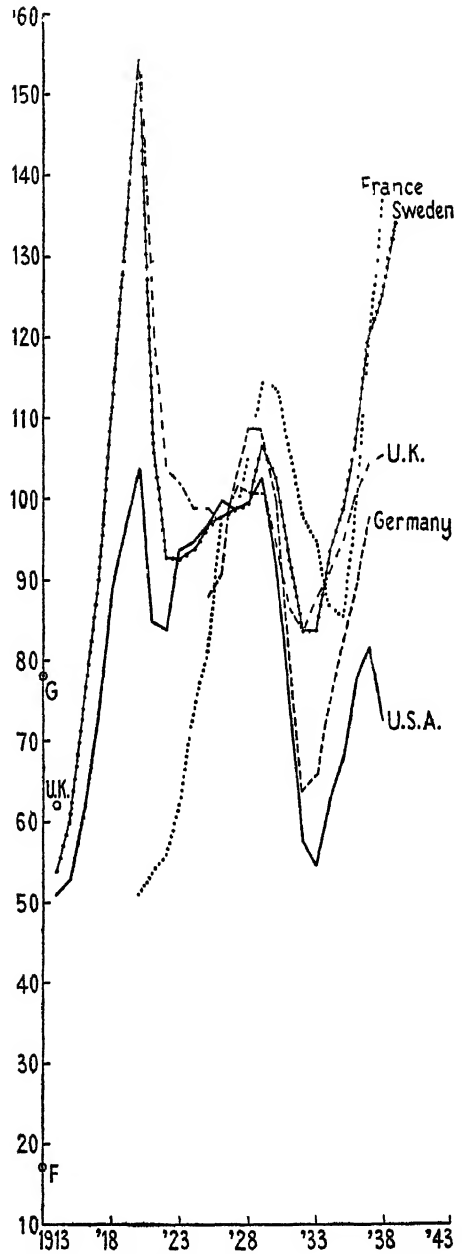
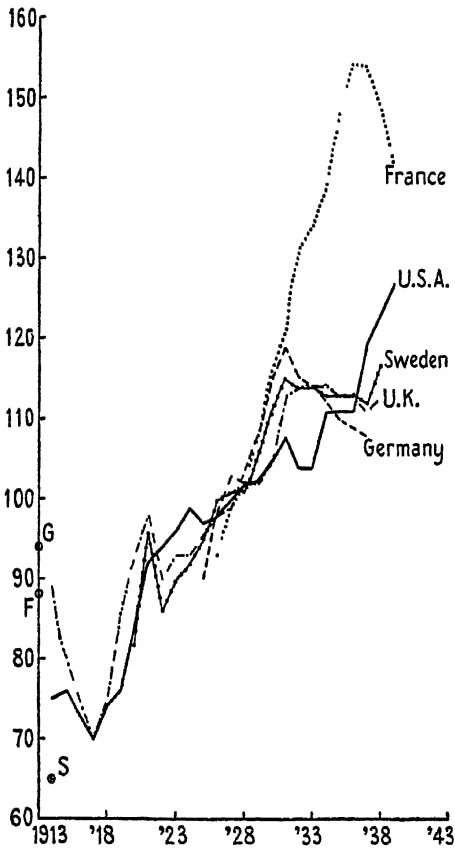


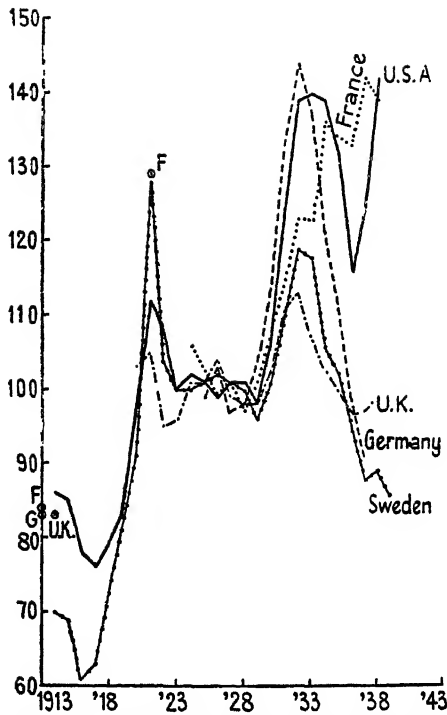


Graph 12. Wage-rate in consumption units
1913/14-1938/9
(1925-9 = 100)

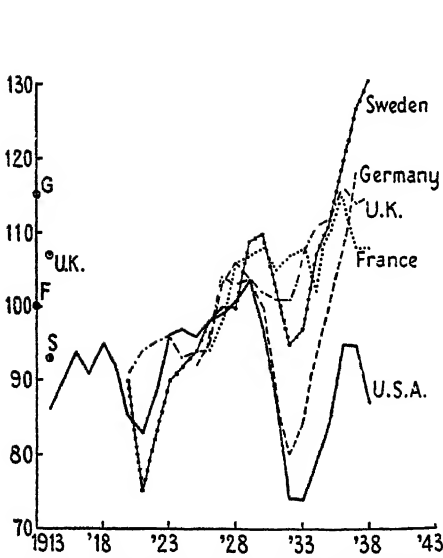


Graph 13. Price-level of final products
1913/14-1938/9
(1925-9 = 100)

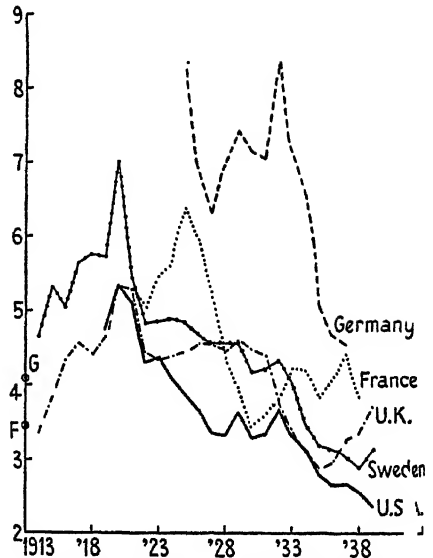




Graph 16. Wage-income ratio 1913/14-1938/9
(cols. 2 + 7 of Table II) (1925-9 = 100)



Graph 17. National Income (in product units)
per occupied person 1913/14-1938
(1925-9 = 100)



Graph 18. Long-term rate of interest
(percentages) 1913/14-1938/9

